REPORT RESUMES

ED 013 304 VT 000 897

RESEARCH PLANNING CONFERENCE FOR BUSINESS AND OFFICE EDUCATION (OHIO STATE UNIVERSITY, FEBRUARY 27-MARCH 4, 1966).

OHIO STATE UNIV., COLUMBUS, CENTER FOR VOC. EDUC.

PUB DATE MAR 66

EDRS PRICE MF-$0.50 HC-$4.96 124P.

DESCRIPTORS- *RESEARCH PROJECTS, *OFFICE OCCUPATIONS EDUCATION, DISADVANTAGED YOUTH, TEACHER EDUCATION, PRESERVICE EDUCATION, OFFICE OCCUPATIONS, PROGRAM EVALUATION, EDUCATIONAL PLANNING, DATA PROCESSING, OFFICE MACHINES, COMMUNICATIONS, *CONFERENCES, SPEECHES, ADMINISTRATION, *EDUCATIONAL RESEARCH, EDUCATIONAL NEEDS, OFFICE PRACTICE, WORK ATTITUDES, BUSINESS SKILLS, FEDERAL PROGRAMS, OFFICE MANAGEMENT, SYSTEMS ANALYSIS, SYSTEMS DEVELOPMENT,

LEADERS IN BUSINESS EDUCATION, ADMINISTRATION, MANAGEMENT, AND EDUCATIONAL RESEARCH ATTENDED THE CONFERENCE WHICH HAD AS ITS OBJECTIVE TO DEVELOP AN OVERALL RESEARCH STRUCTURE WITH SPECIAL ATTENTION TO PRIORITY PROBLEMS IN BUSINESS AND OFFICE EDUCATION. FIVE TASK FORCE GROUPS WERE CONCERNED WITH THE IMPLICATIONS OF RESEARCH FOR TEACHER EDUCATION, CURRICULUM AND PROGRAM DEVELOPMENT, EVALUATION, THE CONTRIBUTION OF BUSINESS AND OFFICE EDUCATION TO PREPARATION FOR NEW AND EMERGING OCCUPATIONS, AND DISADVANTAGED YOUTH. PAPERS PRESENTED AT THE CONFERENCE WERE -- (1) "AN OVERVIEW OF OFFICE TECHNOLOGY, OPERATION, AND MANAGEMENT," BY C. L. LITTLEFIELD, (2) "SYSTEMS AND PROCEDURES RESEARCH IN OFFICE AND ADMINISTRATIVE MANAGEMENT," BY IRENE PLACE, (3) "EDUCATION AND RESEARCH NEEDS IN RECORDS MANAGEMENT," BY BELDEN MENKUS, (4) "TRENDS IN OFFICE MANAGEMENT," BY EUGENE F. MURPHY, (5) "THE STATE OF THE OFFICE," BY JOSEPH W. GAWTHROP, (6) "NEW TRENDS IN BUSINESS DATA COMMUNICATIONS," BY L. H. SOUTHMAYD, AND (7) "NEW DEVELOPMENTS IN BUSINESS DATA PROCESSING," BY J. A. RAMSEN. THE NINE RESEARCH PROPOSALS DEVELOPED BY THE PARTICIPANTS INCLUDED (1) DEVELOPMENT OF A MODEL BUSINESS TEACHER PRESERVICE PREPARATION PROGRAM, (2) IDENTIFICATION OF THE OFFICE FUNCTION IN OUR SOCIETY, (3) DETERMINATION OF THE PRESENT STATUS OF OFFICE OCCUPATIONS PREPARATION IN SCHOOLS OF LESS THAN COLLEGIATE LEVEL, (4) ESTABLISHMENT OF A PILOT STUDY TO DEVELOP A COMPREHENSIVE MEANS OF EVALUATING A VOCATIONAL OFFICE EDUCATION PROGRAM, (5) ANALYSIS OF NEW AND EMERGING OCCUPATIONS COVERED BY THE VOCATIONAL EDUCATION ACT, (6) DETERMINATION OF EMPLOYMENT OPPORTUNITIES AND PRACTICES FOR DISADVANTAGED YOUTH, AND (7) ANALYSIS OF FEDERAL GOVERNMENT SPONSORED TRAINING PROGRAMS FOR PREPARATION OF OFFICE WORKERS. (PS)

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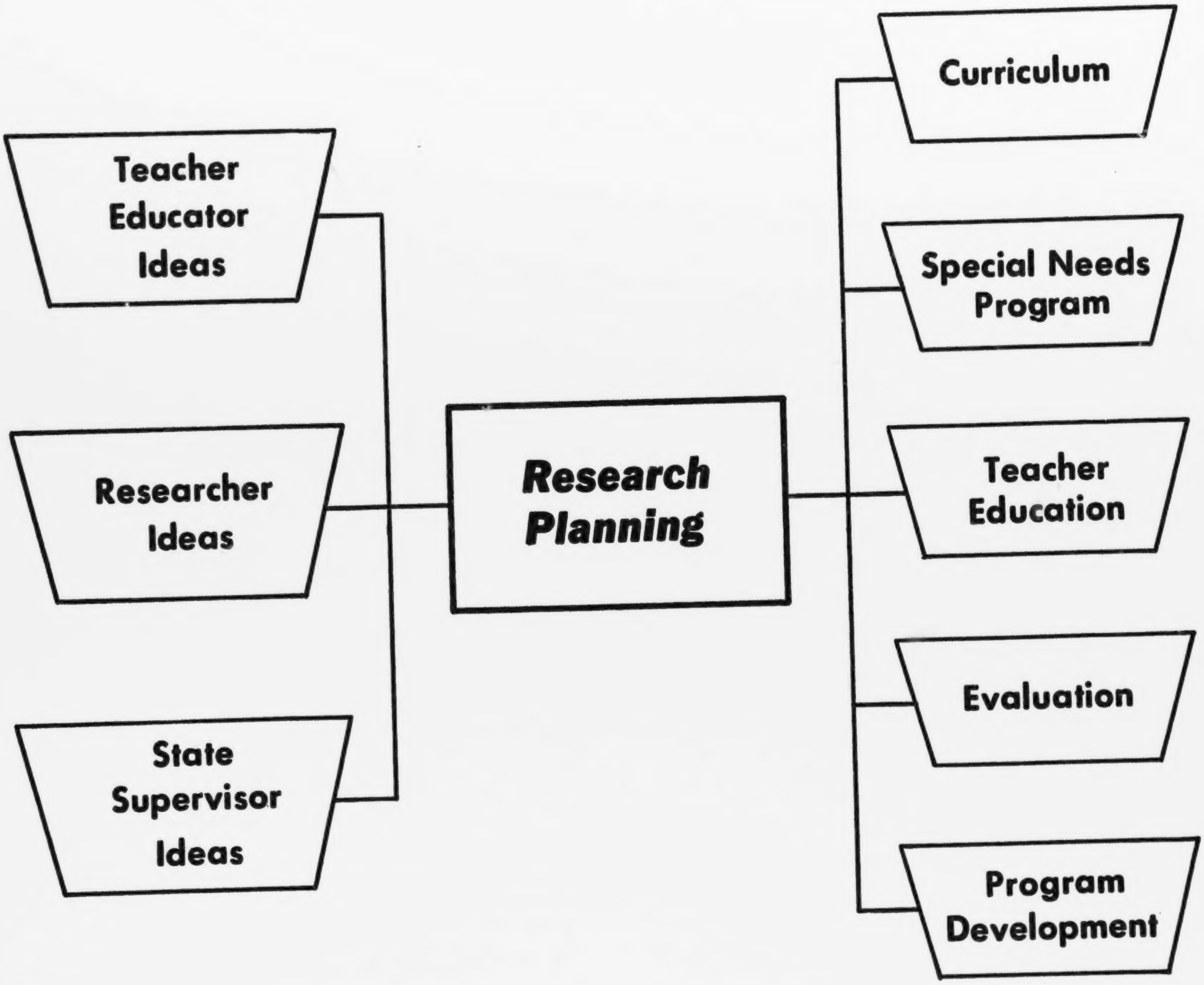
BUSINESS AND OFFICE EDUCATION


Teacher Educator Ideas
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Curriculum
Special Needs Program
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VTC00897

MARCH 1966

THE CENTER FOR VOCATIONAL AND TECHNICAL EDUCATION
THE OHIO STATE UNIVERSITY 980 KINNEAR ROAD COLUMBUS, OHIO 43212

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I. INTRODUCTION

A Research Planning Conference for Business and Office Education was sponsored by The Center for Vocational and Technical Education at The Ohio State University from February 27 to March 4, 1966. The objective of the conference was to develop an overall research structure with special attention to priority problems in business and office education.

The conference provided ~~for~~ five task force groups to concern themselves with the research implications affecting teacher education, curriculum and program development, evaluation, contribution of business and office education to preparation for new and emerging occupations, and disadvantaged youth.

Two keynote speakers of the conference were Dr. C. L. Littlefield, Chairman, Department of Management, North Texas State University, Denton; and Dr. Irene Place, Graduate School of Business Administration, The University of Michigan, Ann Arbor (now at Portland State College, Oregon). Dr. Littlefield discussed an overview of office technology, operation, and management, and Dr. Place presented a special paper concerning systems and procedures with emphasis upon office technology. Other consultants who presented papers included Joseph Gawthrop, Pilot Life Insurance Company; Belden Menkus, Kennecott Copper Corporation; E. F. Murphy, Monroe Division of Litton Industries; J. A. Ramsen, International Business Machines Corporation; and L. H. Southmayd, American Telephone and Telegraph Company. Their topics dealt with new developments in records management, office machines and equipment, business data processing, and business data processing, and business data communications.

Participants in the conference who derived research implications from the presentation of papers and prepared preliminary research proposals included Dr. Ruth I. Anderson, North Texas State University, Denton; Dr. F. Kendrick Bangs, University of Colorado, Boulder; Dr. Fred S. Cook, Wayne State University, Detroit; Dr. Gordon F. Culver, University of Nebraska, Lincoln; Dr. Earl A. Dvorak, Indiana University, Bloomington; Franklin H. Dye, The Center for Vocational and Technical Education; Dr. Geraldine Farmer, University of Alberta, Edmonton; Dr. Jerre E. Gratz, Shippensburg State College (Pennsylvania); Dr. J. Curtis Hall, Richmond Professional Institute (Virginia); Dr. Ramon P. Heimerl, Colorado State College, Greeley; Dr. Charles B. Hicks, The Ohio State University; Dr. F. Wayne House, Pennsylvania State University, University Park; Dr. Russell J. Hosler, University of Wisconsin, Madison; Dr. Harry Huffman, The Center for Vocational and Technical Education; Dr. William E. Jennings, The Ohio State University; Dr. Norman F. Kallaus, The University of Iowa, Iowa City; Dr. Frank W. Lanham, The University of Michigan, Ann Arbor; Dr. Mary Ellen Oliverio, Teachers College, Columbia University, New York; Dr. Estelle L. Popham, Hunter College of The City University of New York; Dr. Ray G. Price, University of Minnesota, Minneapolis; Dr. John L. Rowe, The University of North Dakota, Grand Forks; Dr. Herbert A. Tonne, New York University; Victor Van Hook, Oklahoma State Board for Vocational Education, Stillwater; Professor George A. Wagoner, University of Tennessee, Knoxville; and Dr. Inez Ray Wells, The Ohio State University.

The following people and organizations were consulted in the selection of the participants:

Dr. Bruce I. Blackstone, Head, Office Occupations Education, Division of Vocational and Technical Education, U. S. Office of Education

Dr. Ramon P. Heimerl, President, Delta Pi Epsilon

Dr. Frank W. Lanham, President, Research Division, National Business Education Association

Mr. Bernard Shilt, Vice President, Business and Office Division, American Vocational Association

As a result of the research planning conference this publication was prepared with the help of Dr. Mildred Hillestad, University of Colorado (on leave from Colorado State College).

The remainder of this report is organized in three sections as follows:

II. The Office in the American Economy: A Synthesis of the Research Planning Conference ✓

III. Recommended Research Projects

IV. The Seven Papers Presented at the Conference

II. THE OFFICE IN THE AMERICAN ECONOMY: A SYNTHESIS OF THE RESEARCH PLANNING CONFERENCE

Synthesis committee: Mildred Hillestad, chairman; Franklin H. Dye; Charles B. Hicks; Harry Huffman; and Norman F. Kallaus

If one were to ask the man in the street, "What is an office?", he would likely say, "People at desks typing, figuring, writing, and taking dictation." Although to a certain extent this impression is a true picture, it is a decidedly limited view of the office in today's world.

What is Office Work?

The words, numbers, and symbols on the papers being shuffled by the people in the office pictured above are the raw materials of the office: information. This information, which may be initiated, created, and collected both inside and outside the office, is the "input" into the office.

When a stock clerk uses an order form and checks off the items he pulls from warehouse shelves, he is doing office work. After all items are checked off, the filled-in order form is converted into an invoice, analyzed for sales activity, used for inventory control, and recorded as accounting entries. Thus, the order form coming from outside the organization initiates much valuable information.

Office work -- recording, processing, and storing information -- may be performed in other ways: When a meter reader from an electric company marks the number of KWH on marked-sense cards, when a physician makes entries on a patient's chart, and when a production worker records the pieces of work he has made or inspected, office work is being done. Eventually, the doctor's entries will be retrieved as needed to serve as a basis for his decision regarding treatment of the patient. The production record and the meter reading become inputs for a central processing unit for the necessary calculations. The information on a marked-sense meter reading may be changed to a punched card bill going to a customer and for which the master record is stored and updated. The production records may be the basis for determining the worker's pay check or for controlling inventory. Even though some offices process information by mechanical and electrical means, many offices will probably always continue to use hand methods to process information as they do now.

Usually before the information has value, it goes through one or more manipulations or changes -- it is processed to make it usable for many purposes. However, for the information to be processed, it must be captured in some form -- on punched cards, paper or magnetic tapes, forms, and in memorandums. Then it may go through one or more of the following processes: reorganization, computation, classification, transferral, storage, or retrieval. Any or all of these steps may be needed to increase the utility of the information. This processing produces the "output" of the office, and it may take many forms such as remittances, paychecks, communications, reports, and proposals.

The Economic Value of Office Work

Regardless of where it is done, office work broadly conceived is the handling and management of information in such a way that its economic value is preserved or increased. Because of the growing amount and complexity of office work required in today's business world, the economic value of office work is becoming a matter of increasing concern to management. At every step in its handling, information may be of increasing economic value, but only with a well-designed and well-maintained system that gets necessary information to the right place when needed does it contribute to the economic growth of the firm. Thus, unless management can use the information produced in the office for profitable decision-making, it is of little value.

The Expanding Office Force

If the few information handling situations discussed above are multiplied by the thousands of people engaged in these activities over the United States, and with the increasing amount of information required in conducting the daily business of the nation, one understands why information handling will require an increasingly greater share of the labor force. Department of Labor forecasts(1) indicate that the need for clerical (office) workers will increase by more than one-third between 1965 and 1975 and that by 1975 over half the work force will be white-collar workers.

The efficient handling of information, not only by the clerical force, but also by a myriad of other white collar workers, is necessary for smooth and economical operations in the business world and in the affairs of the nation. But to obtain the full economic value from information produced, gathered, and processed in the office, all the people handling it need to know how and why it is generated, collected, refined, processed, and retrieved. They need to see how it fits into the whole picture and the interrelationships of the functions of business and industry. This understanding is necessary regardless of the function or operation in which an office employee is involved. In short, when office workers recognize the utility of information and maintain a proper information flow, its economic value may increase, depending on the use management ultimately can make of it.

The Importance of Data Communications

With the almost instantaneous need by business, industry, and government for great quantities of data, much of it from remote locations, rapid transmission of data has become increasingly important.

Unless information gets to where it is needed on time, it has no value. Misplaced information is costly because of the inefficiencies it may cause in operating the firm; insufficient, inaccurate, or delayed information can lead to unfortunate decisions. Rapid data communications, along with efficient, almost instantaneous, information retrieval has become a necessity. Typical of the uses of rapid data communications are these examples:(2)

1. A hotel confirms a salesman's room reservation in another city by teleprinter communication with the chain's central office.
2. A builder receives a sketch of a change in an architectural drawing over a handwriting transmission system.
3. A police officer at a remote location uses a facsimile system to dispatch a photograph to headquarters for identification purposes.
4. A branch office manager submits time-card information to the company's home office computer, using a punched card transmission system.
5. A doctor in a small town transmits an electrocardiogram of one of his patients to a distant university hospital for analysis by a heart specialist.
6. A scientist obtains a copy of a research study on space medicine from library records by means of a microfilm transmission system.
7. On Monday morning, a sales manager receives a report of the preceding week's sales via teleprinter service from the corporate data processing center.

Each of these examples shows the use of a data communication system in transmitting information almost instantaneously some distance. Because of this capability data communications plays a vital role in operations and management.

These changes in communication devices and information requirements have affected not only the design and manufacture of new equipment, but also have effected changes in the design and function of many of the familiar tools of the office. Some typewriters have a keypunch arrangement of the numbers instead of the conventional row of numbers; calculators come equipped with a 10-key keyboard; electronic calculators with programmable storage facilities; and printing calculators operate as rapidly as rotary machines.

Increased Value of Correct Judgment

The increased speed and capacity of the equipment handling these quantities of data have added to its cost. Much thought and analysis are required in determining equipment needs in terms of both time and money. Efficient utilization of data communications and data processing equipment demands careful judgment about what data needs to be transmitted, the form it should take, whether it needs to be stored and for how long. Such decisions are necessary, too, regarding written communications, since written information is occupying more space than ever. Unless office personnel understand the place, use, and function of all types of information within the enterprise, it can not be used economically or purposefully by the company.

The Changing Nature of Office Work

The greater efficiencies made possible by technological advances have changed the organization of the office. For instance, these advances have made possible centralization of certain accounting functions, such as payroll or billing for an entire firm whose many branches may be scattered from coast to coast. They have changed the very form of the data; that is, instead of numbers on a card, information now may appear as magnetic spots on tape, punched holes in paper tape, spots on a metal disk, or dark and light spaces on a transparent plate. They have made possible solution of more complex, broader problems in management.

The advances in technology have enhanced the value of office personnel. The people who plan the system and the utilization of the equipment, who implement the plans with their proper and efficient use of the equipment, are the key to the successful, economical functioning of the office. Because the machines can handle routine, time-consuming tasks more efficiently than people can, the personnel are free to engage in more creative approaches to solving problems in the office. Richard Starr, President, Tabulating Search and Development Agencies, (2) points out the changing viewpoint regarding the values of men and machines:

> The first 10 years of the EDP industry witnessed people almost totally discussing the awesome capabilities of the computer. I predict in the second 10 years, which loom just ahead for the EDP industry, we will witness people primarily discussing the astounding fact that the creative capabilities of the men and women who utilize the computer are more than one million times greater than that of the computer itself.

The Changing Qualifications for Office Workers

Today's office work requires personnel with higher level qualifications than ever. More office workers must have a higher level of judgment. They are required to have experience in the technical aspects of the new information processing equipment. They will need a broader understanding of the function of the office as a part of a complete business system.

Statland(4)in discussing the development of information systems points out that:

> To design a computer-based management information system, it was found that the concepts for systems development work had to be completely revamped. For the first time, analysts were sent out to observe the operating departments and determine not what the managements thought they did, but rather to find out exactly how these departments did function and what practices and procedures would make them function more effectively. For the first time, systems planning consisted primarily of analysis of factors involved in generating and maintaining flows of information and the steps involved in performing production-type processing operations. The essence of systems design became the development of all specifications for implementing the solution to the overlapping needs of each subsystem as revealed by the analyst rather than piecemeal and unrelated development of systems for individual departments.

The development of systems that allow freedom for decision-making and creativity and that offer challenging jobs is essential in creating an image of the office with which today's bright young people will want to identify. They should know about technological advances and human adaptability. The education of these people must provide for transfer and generalization of what is learned to new procedures and situations. Permeating all office education, though, should be emphasis on the business system as a whole, specific areas with the system, and on the concept of the office as an integral part of an over-all system.

Changes in office function resulting from automation and systemation are going to require a more highly educated personnel, not just technicians. In order for business education programs to produce tomorrow's business employee, business teachers, too, need to keep updated in these concepts as well as in new techniques.

Business teachers must seek answers to such questions as these:

> Is adaptability a native trait or is it something that can be developed?
>
> How fast is change in information technology and in management techniques taking place and in which direction?
>
> What evidence do we have about the real rate of change in business and industry?
>
> How much "lag" is there between technological advances and practices in the office?
>
> How can teachers develop judgment in their students?
>
> What judgments are necessary on the various jobs students will perform in offices initially and in the future?

These and other pertinent questions are discussed further in the last section of this report.

III. RECOMMENDED RESEARCH PROJECTS

The following proceedings of the five task force groups are reproduced here as they were developed by the groups.

Group I - Teacher Education - Frank W. Lanham, chairman; Earl A. Dvorak; Geraldine Farmer; and George A. Wagoner.

Proposal 1

To develop a model business teacher preservice preparation program.

Rationale

While similar models may be desirable for the baccalaureate degree person entering teacher preparation and also for the practicing business teacher, the focus here is on undergraduate preparation.

The importance of this study hinges on the changed and changing business and educational world. The model we propose to be developed will reflect the following needs we identify (or will be identified) as growing out of change.

1. The need to develop a teacher who adjusts, a teacher who has the ability to identify significant problems, has the methods of sound thinking to seek their solution, and has the desire to arrive at answers.
2. The need for current knowledge and understanding of philosophy, procedure, and practice of a business and economic world.
3. The need for current knowledge and understanding and the relationships evolving from disciplines upon which education is built, such as psychology and sociology. For example, we believe the business teacher of tomorrow must be abreast of the developing learning theories.
4. The need for skills, knowledge, and understandings in the use of the broad spectrum of educational technology, in the innovations of structuring learning such as the ungraded school and team teaching. These skills, knowledge, and understandings must encompass the education emerging in other institutions such as education in the Job Corps and private industries.

5. The need to develop skills, knowledge, and understandings of the leadership functions of the business teacher in his relationships with the business community and in his relationships with other educational groups. Thus, we believe the business teacher must possess an expertness in business affairs to enable him to consult with and to aid his business community. We believe the business teacher must possess an expertness as an educator in the broad sense, such as in matters pertaining to curriculum development, guidance, and the like.

6. The need to develop competency in the unique characteristics of the business teaching task. Notable among these is the competency in teaching business skills combined with competency in developing concepts, values, judgments, and generalizations.

7. The need for differentiated curriculum in teacher preparation to provide for a balance between breadth and depth within the numerous areas of business administration. No longer can we have teachers teaching economics who do not have depth in economics. No longer can we have teachers of bookkeeping whose knowledge of accounting is limited to an elementary course.

8. The requirement of a business teacher to construct meaningful experiences adapted to the particular needs of people with whom he works. For example, we mean the ability of a business teacher to draw on his reservoir of business administration and economics backgrounds as the basis for effective instruction in general business at the high school level.

Methodology

To accomplish the curriculum model in business teacher preparation, we visualize a methodology similar to other curriculum projects such as SMSG. Whatever the final methodology may be, the following steps appear to be obvious:

1. Validation of criteria -- or problem areas in business teacher preparation -- which is to be reflected in the model.
2. Identification of elements of a preservice program.
3. Organization of the elements into a meaningful framework.
4. Submission of the model to a knowledgeable group comprised perhaps of representatives from business, business education, and other areas of professional education.

5. Revision of the model.
6. Demonstration.
7. Evaluation followed by necessary modification.

Group II - Curriculum and Program Development - Norman F. Kallaus, chairman; Gordon F. Culver; Mary Ellen Oliverio: Irene Place: and Ray G. Price.

Proposal 2

To identify the nature and scope of the office function in our society and world of work.

Assumption

That office work can be identified (differentiated from other basic functions of an organized group enterprise, assuming that the other basic functions are management and administration, finance, personnel, production, and distribution) by the result or impact on the total organization of the decisions which individuals make.

Hypothesis

Those decisions made by administrative service employees are different from those decisions made employees who determine the policies and destiny of a total organization and, this difference can be used to characterize office work.

An Operational Definition

The office services (administrative services) being identified here involve information processing and are to be differentiated from such other administrative services as building and ground maintenance, cafeteria maintenance, and garage maintenance.

Outcomes

This study should reveal

1. the uniqueness of office activities
2. characteristics of office work common to all levels
3. levels of office work within a firm.

Further Anticipated Outcomes As a result of information gained from such a study, we further anticipate clarification of

1. levels of office education and their contribution to the total preparation for business
2. levels of education required to meet employment for any one level
3. the contribution of each level to the total preparation for business
4. difference between office education and business administration education (or engineering education)
5. progression or relationship among these levels

Procedure

1. Pilot study of the types of decisions made by all employees who work with or use information (interview method)
2. When a practical research design has been developed, a full-fledged study should be conducted to include a representative cross sampling of all types and sizes of organizations (to include government) and all types and sizes of communities.

Suggested Phase of the Total Study

1. Collect and analyze date
2. Classify data by established categories and relate classifications to
   a) job levels
   b) impact upon the destiny of the company
3. Draw educational inferences from above as to
   a) course content
   b) levels at which these courses should be taught

Proposal 3

To determine the present status of office occupations preparation in schools of less than collegiate level?

1. How does preparation vary in relation to range of courses offered, extent of time spent, etc?
2. How does preparation vary in relation to specificity of occupational preparation?
3. What are the levels of positions for which teachers feel they are preparing students?
4. What are the curricular arrangements used in the several programs?
5. Who are the students enrolled?

6. What are the types of relationships with the business community?
7. How is office preparation coordinated with counseling and placement services in the school?
8. How is office preparation related to programs in other vocational programs in the school?

Justification

Preparation for office occupations is currently provided in a wide range of types of educational institutions. We find office preparation in vocational high schools, comprehensive high schools, community colleges, post-high school technical institutes. How do these programs differ? What are the goals at the various types of schools? Possibly we should make a comprehensive study of what is presently the situation as a means of determining what the next steps are.

Group III - Evaluation - Russell J. Hosler, chairman; Jerre E. Gratz; Charles B. Hicks; Mildred Hillestad; and William E. Jennings.

Proposal 4

To determine the degree to which vocational office education programs are meeting the full range of individual, social, business and economic needs of the communities which they serve and to establish a pilot study to develop a comprehensive means of evaluating a vocational office education program.

Procedures

1. Survey the related literature regarding evaluation of school programs and the role of the school in the community.
2. Select a school from which to gather data about students who have entered office occupations upon graduation.
3. Gather data from school about the students:
   a) pattern of school experiences
   b) scholarship, personnel, and extra-curricular activities records
   c) information from appropriate teachers and counselors:
      their interpretation of the students school experiences
      their attitudes and opinions about business and careers in business

4. Develop instruments to measure:
    - a) Job performance by a variety of means of peer ratings, supervisor ratings, self analysis, and performance records.
    - b) Job satisfaction through interviews with employees, parents, peers, and supervisors.

5. Use the instruments developed in #4 to gather data from business about these graduates.

6. Analyze data for patterns of relationships between vocational performance of students in the office and the student's preparation.

7. Apply the instruments developed in several schools for validation.

It is possible that these aspects could be related to the study and integrated into the study also:

1. Relation between school dropouts and job success.
2. Relation between transfers out of the vocational business program and job success.
3. Relation between business and general curriculum and job success.

It is contemplated that the study would extend over a five-year period with yearly evaluation of the employees.

Group IV - Contribution of business and office educations to preparation for new and emerging occupations - J. Curtis Hall, chairman; Ruth I. Anderson; F. Kendrick Bangs; Franklin H. Dye; Ramon P. Heimerl; J. A. Ramsen; and Victor Van Hook.

Proposal 5

To analyze the business components in the preparation of workers in new and emerging occupations covered by the Vocational Education Act.

Justification

The period since World War II has been characterized by changes in the nature of all occupations. Widesweeping technological developments have resulted in a closer interrelationship among all areas of work. For example, the operator of a greenhouse must be familiar with the changing technology in agriculture, with equipment utilization and maintenance, with the marketing of his products in a highly competitive field, and with the current business practices affecting his total operation. A homemaker today not only is concerned with problems of food, clothing, and household equipment, but must also have an understanding of garden and lawn care, child care, home nursing, budgeting, credit, comparative buying, and efficient use of business services. Because of these interrelationships, it is obvious there is need for concerted cooperative effort among the vocational areas.

Problem

The problem is to determine the business components involved in the preparation of workers in new and emerging occupations in agriculture, trade and industry, home economics, distribution and health.

Specifically, the problem includes:

a. A review of the business knowledges, understandings, attitudes, and skills essential to all persons, regardless of vocation.

b. An identification of occupations requiring interdisciplinary preparation.

c. An identification of the specific business components of jobs performed by workers in agriculture, trade and industry, home economics, distribution and health.

Procedures

Procedures for conducting the study will include:

a. Analysis of previous research on business knowledges, understandings attitudes, and skills needed by all persons.

b. Analysis of job descriptions for which agriculture, trade and industry, home economics, distributive and health education are preparing workers.

c. Preparation or collection of job analyses for the jobs identified in (b).

d. Identification of recurring business knowledges, understandings, attitudes and skills revealed through the job analyses. (A technique such as factor analysis might be used).

e. Recommendation of ways in which business and office education can cooperate with agriculture, trade and industry, home economics, distribution and health education in the preparation of workers in this area.

Proposal 6 (Group IV Continued)

To determine the educational preparation in business that will enable the individual to adapt to the changing office environment.

Specifically the problem is to determine:

a. What office workers need to know about business. (organization, objectives, operation, place of business in the economy, changing technology)

b. What are the new and emerging office occupations.

  1. To determine what new jobs have evolved for which qualified workers are not available.

  2. To determine what new jobs business can foresee at this time.

c. What are the common skills and knowledges needed to enter the emerging office occupations.

  1. New Jobs

    (a) What communications skills are needed?
    (b) What do office workers need to know about the interrelationships of communication devices?
    (c) What computation skills are needed?
    (d) What office workers need to know about management?
    (e) Etc.

  2. Emerging Jobs

    (a) What communications skills are needed?
    (b) What do office workers need to know about the interrelationships of communication devices?
    (c) What computation skills are needed?
    (d) What office workers need to know about management?
    (e) Etc.

d. What kind of occupational programs in business can be evolved to enable the individual to adapt to the changing office environment.

Procedures

The procedures used will include:

a. An analysis of the last two editions of the Dictionary of Occupational Titles; Occupation Outlook Handbook: Manpower Reports; and similar publications.

b. A random sampling of business, government, education, and professional offices that are adjusting to changing technology.

   1. Questionnaires for large general mailing
   2. Sufficient interviews to validate the sample

c. A synthesis of the findings by a team of representatives from education, psychology, sociology, business, and administration. This synthesis will include recommendations for:

   1. Office education curricula and course content
   2. Preparation of business teachers

Group V - Disadvantaged youth - Herbert A. Tonne, chairman; F. Wayne House; Harry Huffman; Estelle Popham; and John L. Rowe.

Proposal 7

To compare the attitudes toward office work of urban disadvantaged high school students and employed disadvantaged office workers with implications for raising the level of aspiration of disadvantaged youth in the secondary schools.

Rationale for the Study

In emerging teacher-education programs for urban disadvantaged youth, emphasis has been centered on a better understanding of the background and environment of these students. In addition to this necessary objective, though, is the further responsibility of the office educator to help students understand the nature of office work and their place in it.

The first step toward achieving this goal is an investigation of present attitudes of high school students in urban disadvantaged areas toward office work.

The second step is a comparison of student's attitudes with those of experienced office workers of similar background as well as a review of their work histories.

From this comparison, it is assumed that a better understanding of the disadvantaged student -- his motivations, aspirations, prejudices, and his opportunities -- will evolve, resulting in more practical teaching-learning materials, more realistic program planning, and better teaching.

The Problem

The growing numbers of students in secondary schools who are disadvantaged in one respect or another is a perplexing problem to all school administrators and especially to those who have the responsibility of training them for useful work. Aside from the problems of literacy, minority-race background, psychological factors, and economic deprivation, the problem of attitude toward work looms large in getting the students ready to cross the threshold of work. Many have not been exposed to an environment of working people and have no concept of the dignity and satisfactions that come from work. Many are defeatists in that they see no hope of becoming employed even if job opportunities did exist. Many feel that they are not wanted or that for various reasons employers would not find them acceptable. Many have come from environments that might be called "anti-work, anti-class, anti'everything."

Specifically, the primary problem is: To identify the aspects of job aspiration that will inhibit optimum development of the disadvantaged for initial office employment and to identify the elements that enable office workers from disadvantaged groups to progress satisfactorily on the job.

Subproblem 1: What is the attitude of present disadvantaged high school girls toward office work as a career so far as salary, career opportunities, social acceptance, work environment, and job satisfaction are concerned?

Subproblem 2: What is the attitude of female office workers from similarly disadvantaged backgrounds toward the same elements after five years of office experience? What factors contributed to change of attitude? What positions were held during the employment period? How was their education continued? What would they have done differently in high school? What factors contributed to their success or failure?

Subproblem 3: How can the information obtained from this comparison be used effectively to develop better attitudes and enhance the potentials for successful office employment?

Proposal 8 (Group V Continued)

To determine employment opportunities and practices for disadvantaged youth based upon job analyses and employment practices .

Statement of the Problem

This study will attempt to determine the kinds of jobs that exist for disadvantaged youth based upon job analyses and employment practices.

1. Identify disadvantaged youth

   Reading, computation, following instructions, write sentences and paragraphs, lack background, haven't done well in school, does not test well on achievement, low achievers, poor attitudes to school learning, unable to pursue a normal school curriculum. Delimitation: Does not include physically or mentally handicapped.

2. What kinds of jobs exist in offices for the disadvantaged?

3. To what extent has business and industry matched jobs with the characteristics of the disadvantaged (as listed in 1)?

4. How can disadvantaged with appropriate training be matched with office jobs suitable to their training?

5. To propose a paradigm of training and retraining to accommodate the disadvantaged.

Procedures

1. Survey the literature to determine an appropriate definition and description of the disadvantaged.

2. a. Obtain job descriptions and specifications from business and industry concerning office jobs that might be held by the disadvantaged.

   b. To conduct job analyses in order to determine job requirements for other office job opportunities.

3. Conduct interviews with personnel and office managers to determine the extent to which they have employed the disadvantaged with appropriate training.

4. To develop a training program based on student capability and potential in order to set up job requirements.

Proposal 9 (Group V Continued)

To analyze Federal government sponsored training programs for preparation of office workers.

Purpose

To select successful techniques as a basis for improvement of secondary school program.

A secondary purpose would be to improve the preparation of business teachers.

Among the elements to be studied would be objectives, selection, teaching materials, facilities, equipment, teaching procedures, personnel, administration, financing (cost) and outcome (placement).

Hypothesis

Government office training programs because of this specialized purpose and new approach to the problem have developed patterns that may contribute to the improvement of secondary school business education and business teacher education programs.

Procedural Steps

1. Identify type of programs to be studied
2. Select specific installations that are considered as most superior by the program administrators
3. Develop a check list of items to secure through personal interview relevant data to isolate the characteristics that make these programs unique.
4. Conduct personal interviews and observations in the installations selected.
5. Analyze and synthesize the common elements of superiority found by these observations.
6. Determine the elements of superiority that are unique in the government sponsored programs that might be incorporated into high school curricula and business teacher education programs.

Delimitations

1. Only programs directly sponsored and financed in part or in whole by the Federal government will be studied.
2. No attempt will be made to study all programs -- only those selected installations considered superior by the chief administrative officers involved will be considered.
3. The study will be limited to those programs which will have groups of learners who completed the program for a period of at least six months prior to the analysis of the program.

IV. THE SEVEN PAPERS PRESENTED AT THE CONFERENCE

The seven papers made available to the participants at the conference are listed below:

1. C. L. LITTLEFIELD, Chairman, Department of Management, North Texas State University, Denton

   An Overview of Office Technology, Operation, and Management

2. IRENE PLACE, Associate Professor of Office Management, Graduate School of Business Administration, The University of Michigan, Ann Arbor (now at Portland State College, Oregon)

   Systems and Procedures Research in Office and Administrative Management

3. BELDEN MENKUS, Editor, Systems Manuals, Kennecott Copper Corporation, New York, N.Y.

   Education and Research Needs in Records Management

4. EUGENE F. MURPHY, Vice President, Monroe International, Inc., A Division of Litton Industries, Orange, New Jersey

   Trends in Office Machines

5. JOSEPH W. GAWTHROP, Second Vice President and Director of Planning, Pilot Life Insurance Company, Greensboro, North Carolina

   The State of the Office

6. L. H. SOUTHMAYD, Data Communications Planning Manager, Marketing Development Division, American Telephone and Telegraph Company, New York, N.Y.

   New Trends in Business Data Communications

7. J. A. RAMSEN, Industry Marketing Education Representative, International Business Machines Corporation, Chicago, Illinois

   New Developments in Business Data Processing

Paper 1

AN OVERVIEW OF OFFICE TECHNOLOGY, OPERATIONS, AND MANAGEMENT

C. L. Littlefield

Do you remember when Office Management suddenly became Administrative Management? During the period from 1960 to 1962, the National Office Management Association was re-named as the Administrative Management Society, and the title of its chief publication was changed from The Office Executive to Administrative Management. The Office Management Division of the American Management Association became the Administrative Services Division. The National Machine Accountants' Association became the Data Processing Management Association; the Office Equipment Manufacturers' Institute became the Business Equipment Manufacturers' Institute; and in a move that seemed to abandon some of the territory being occupied by the new field as if beyond its scope, the Controllers' Institute of America became the Financial Executives' Institute.

Accompanying these developments was revision of the organization structures of a substantial number of enterprises to create a position of Administrative Vice President (or similar title) and to place under this position such functions as Operations Research, Systems and Procedures Analysis, Data Processing, and Office Services.

What conditions led to these changes, and what was the promise of Administrative Management? Office Management as traditionally conceived had been limited mainly to providing basic office services, and greater opportunities now beckoned. At the same time that new needs were becoming apparent, the means by which these needs could be met, particularly computers and other tools of information technology, developed with speed.

Indeed, we saw a paradox in which the tools themselves spurred management recognition of office potential hardly dreamed of earlier since assumed to be unattainable.

What was the dream of Administrative Management? It was to provide information that would lead to much sounder decisions by all managers and employees and to coordinate activities of specialists through policies, systems, and methods geared to total enterprise requirements rather than to isolated functions or tasks.

Has the dream been realized? Only to a very limited extent, even the most enthusiastic supporters are forced to answer. We can observe certain notable advances:

1. Information is recognized increasingly as exercising a discipline all its own, with decisions largely dependent upon information flowing to and from persons responsible.
2. Decision theory has taken large strides in extending ability to program, reducing areas of uncertainty, and quantifying factoral relationships through operations research.
3. The technology itself has progressed remarkably, so much so that the greatest difficulties now are usually those of determining factors that bear upon decisions and information pertinent to factors.
4. The systems concept has emerged as the most powerful of the integrative concepts, simplifying and coordinating complex undertakings, and linking decisions and actions to achieve objectives.

But management skill in harnessing and using the new tools has lagged. Perhaps there has not yet been time to become aware of many of their implications such as the need to overhaul systems rather than merely go through old ones faster, to adapt organization structures, and of special concern in this workshop, to understand human adaptations needed.

I wish to concentrate briefly upon certain of these human adaptations. This workshop is to end with a focus upon people and their needs. Accordingly, it may be helpful if we can begin with a similar focus.

Systems and people

System brings mixed blessings. It makes work purposeful, orderly, and efficient. But in doing so, it restricts the freedom of individuals to decide and act.

In my opinion, the greatest challenge of our time lies in determining how to use system yet preserve individuality. Can we reap the benefits of system and, at the same time, tap the immense reserves of creative ability within people and develop feelings of responsibility and achievement?

This is obviously a problem for society at large, as it is for a single enterprise. Perhaps it is often a joint problem for society and the enterprise. There are a great many problems of the latter sort, one example being the relationship between responsible citizenship within and outside the enterprise. Each seems to support the other.

Let me pursue this line of thinking briefly to try to clarify the systems problem just mentioned. How can we, in our social and economic systems, bring more order to prices, purchasing power of the dollar, employment, education, and provision for the underprivileged, the ill, and the aged-- yet maintain a large measure of the freedoms that are the unique heritage of America and the source of much of our strength?

Many social scientists have concluded that system, with control, is a paramount requirement for coping with social problems such as those mentioned. Robert Heilbroner has made the interesting suggestion that the side-effects of automation (on employment, economic stability, and the like) are greater than the direct effects, and that business leaders appear to be incapable or unwilling to cope with these side-effects, hence government must assume a larger and larger role as protector of the people.

I would turn Heilbroner's statement around and ask whether the side-effects of governmental control systems, carried beyond some point, may have greater impact than their direct effects. The principal side-effect in such a case would seem to be an increasingly dependent relationship in which people assume less and less responsibility for their own well-being.

The current War on Poverty is pointed toward eliminating material deprivation and toward raising the economic level of the underprivileged and uneducated. The purposes are worthy, and much good probably will result. But what then? Is it possible that we could be left with a poverty even more serious--a poverty of the spirit?

One way to look at this is to consider the effects of charity upon its recipients. There is a real place for charity; sometimes it is essential. But charity is seldom appreciated greatly unless the recipient is helpless. More common reactions are, initially, some degree of resentment because of damage to self-image, and, later if acceptance of charity continues, a child-like dependence. It is not what we do for people but what we do to them that seems to matter most. The best service to another is to help him to stand on his own feet.

Some say there really is no problem--that people prefer to be led, want security above all, and are passive and indifferent. I ask, following the lead of more and more behavioral scientists, "Were they born passive and indifferent, or have they become that way as a result of their environment--at home, at school, at work, and elsewhere?" And if the answer is that environment made them that way, it follows that changed environment could bring changed personal aspirations.

Actually, I believe strongly that the most powerful movement toward freedom in the world's history is now well under way, both in society generally and within organizations. Living standards are improving, enabling people to aspire to higher levels of achievement than merely the material needs. Education, the great liberator, is being pressed at an accelerated pace, enabling people to think and to question. And as people are taught to think, they want to think.

General Douglas McArthur, in a moving address shortly before his death, expressed this idea most forcefully to attendants at the fiftieth anniversary program of S.A.M. While discussing freedom, he said that freedom means more than the right to attend the same schools, eat at the same restaurants, and work at the same jobs, as basic as these rights are. The highest form of freedom, he said, is the freedom to create.

If this kind of thinking has merit, what are its implications for the management of individual enterprises and, particularly, for the use of systems within enterprises? I believe it brings us back to the question posed earlier, and I suggest further consideration along the following more specific lines:

1. How can we design systems that allow areas of freedom for decision and spheres of personal responsibility?
2. How can we design individual jobs that will challenge a new generation of employees that are better educated than any preceding them?
3. How can we develop a managerial climate that provides dignity and self-fulfillment in work itself, and that encourages self-direction and self-control?

In general, what can we do through enlightened management, research, and education to make of system a powerful servant but never a master?

Need for willingness to change--and implications for education

The above discussion of systems and people suggests need for building flexibility into systems. I believe that it follows directly that we must build flexibility into the people who are involved.

Systems themselves, while imposing a certain rigidity upon an organization and its people, must themselves be dynamic. Entire office systems, as well as other systems, are likely to undergo continued change that is far more drastic than in earlier periods. Methods of performing specific tasks will change even more, under the influence of fast-developing technology.

We now often hear predictions that the rate of change will be such that the typical person will need to learn several sets of skills in his lifetime. People entering jobs must have skills in current demand or must soon develop them; indeed, there is now a large "expert gap" in office technology, requiring both quality and quantity of educational output. But they must also be able and willing to re-learn more than the people of any generation preceding them.

Required, therefore, are both willingness and ability to change. Both are facilitated if an individual understands the purposes of his work and the reasons for change. Both are facilitated, also, if an individual has met change before he comes to the job and learned to adapt to it.

So I would ask: How can we in education best prepare and condition people for change? Do we need something that we might call a liberal education for work--education that liberates more than it imprisons, perhaps emphasizing analysis, adaptation, and creative thinking. Is this sort of education possible where office skills are involved? If it is, what can best be done in one's basic education and what must be done later?

Postscript on research that may be required

We do not yet possess adequate understanding of the knowledge and skill requirements of modern man-machine office systems. Where can we get this understanding? In business itself, I believe, where it is possible to study jobs and their requirements in the context of whole systems, where the full interplay of human and physical factors is observable.

There is usually an inverse relationship between sophistication of research methodology and the scope and significance of problems studied, at least in management situations. To illustrate, we can do quite rigorous research on a single problem or segment, such as determining the degree of satisfaction of an employee group and analyzing reasons why. But to do so may be to overlook employee responsibility and performance, which somehow we must obtain, and it may ignore other interested groups such as customers and owners who do not like to be ignored.

Research of a narrow problem out of context is comparable to working hard at improving the method of performing one operation when the whole procedure needs replacing or over-hauling. Dr. Lillian Gilbreth has a favorite statement for describing this type of research. According to her, "A planned mistake is still a mistake."

Paper 2

SYSTEMS AND PROCEDURES RESEARCH IN OFFICE AND ADMINISTRATION MANAGEMENT

Irene Place

The purpose of this paper is to consider the nature and scope of office systems and procedures analysis. The presentation is sectionalized as follows:

1. The _Office_ and the Clerical Function
2. Skills and Knowledges of the Systems Analyst
3. The Systems Concept
4. Changes in Data Processing Concepts
5. Areas of Research

The Office

The word _office_ has a variety of meanings: a religious ceremony, for example, such as the _office_ of marriage; a position of authority, such as the _office_ of the President of the United States; or a function such as the _office_ of the ears is to hear. In England, the word is even used to identify that part of a house where servants perform their duty.

In business, the _office_ is a place in an organization where information processing work is performed: numbers are accumulated, classified, calculated, and summarized; letters are written; budgets are duplicated and distributed; bills are paid; minutes of meetings are typed and filed; and progress reports for complex projects are organized. The role of the office in an organization is supportative to management (the decision makers) and to vital functions of the organization such as manufacturing, marketing, personnel administration, and finance. Information which the office processes does not originate in the office.

It originates in the vital functions--on the production line, in the factory, and at management meetings. The supportative role of the office to a manager or administrator can be compared to the supportative role which a drafting room plays to an industrial engineer.

Synonyms for office reflect the connotation of a position of trust and subordination. For example, the synonym post emphasizes the idea of duty or responsibility whereas the synonym situation emphasizes the idea of employment in a subordinate position such as an accountant or a secretary.

The office in an on-going organization is, therefore, an information processing place, not a vital decision-making place. Physically it may be a desk and a file in a corner of a single room or it may be an entire building depending on the size of the parent organization. In either situation, this is where the information servicing function is performed. It is the place where records are maintained so that the operations of the particular business the office is serving can be directed and developed. The identity of the office is derived from the group it serves and is designated by qualifying words; so that we have a law office, a school office, the ship's purser's office, Westinghouse's home office, the United States Government's patent office, or the registrar's office at Ohio State University.

The Clerical Function

Those who specialize in office work are generically known as clerks. The function of clerks is clearly understood to be different in an organization from that of managers or factory workers. It is widely understood that an office clerk keeps records, accounts, and correspondence; uses a typewriter, adding-calculating machines, and more recently electronic data processing equipment.

Because of the continued increase in the number of employees who came within this occupational classification, the word clerk, like most generic words of wide application, became an indefinite term and needed clarification. This clarification is achieved by adding descriptive words to clerk or by special job titles which are generally understood to be within the office clerical category. Such titles indicate the level, scope, or type of clerical work performed; for example, file clerk, mailroom clerk, data-processing clerk, typist, stenographer, receptionist, correspondent, and accountant.

Administrative Services Management

In management and business administration circles, the term administrative services is replacing the word office. A few years ago, the National Office Management Association changed its name to Administrative Management Society. College courses in office management are being replaced by administrative services management courses. In business, the title office manager has been almost entirely replaced by the title administrative services manager.

The status and scope of an administrative services manager's responsibility within an organization depends on the size of the organization, the nature of the business, the organization of the parent organization, and the business orientation of the top managers. Some managers conceive of administrative services as encompassing accounting and integrated electronic data processing activities;others conceive of it as encompassing the mail room, duplicating room, central files, a stenographic pool, stationery supplies, and the company cafeteria. As electronic data processing equipment applications become more sophisticated, the latter scope for the administrative services function becomes more prevalent. That is, a reclassification or separation has occurred within the traditional concept of the office function itself. The newer phase--electronic data processing--is being separated organizationally and jurisdictionally from administrative services. Electronic date processing, the glamour aspect of office work, is being phased into the systems and procedures department. We have then two types of offices today; administrative services and systems and procedures analysis. The situation is somewhat analogous to cutting an apple in two, claiming that part No. 1 is more useful than part No. 2. The manager of part No. 1 in today's business organization reports separately from part No. 2 to the controller, an executive vice president, or even the president. He is entitled Director of Data Processing, Manager of Systems and Procedures, Manager of Systems Research, or Director of Management Information Systems. The manager of part No. 2, on the other hand, is likely to report to an assistant controller or the controller and is variously entitled Manager of Administrative Services, Manager of Office Methods, or Supervisor of Office Services. This last title suggests a new and further subordination because it suggests that part No. 2 is now supportative to "office" activities rather than to the organization as a whole.

The two segments of the office function are still further distinctively characterized. For example, the traditional office activities of filing, typing, stenography are almost entirely performed by females--mostly young, inexperienced, high school graduates. The turnover in these positions is high, the salaries are among the lowest paid in business and more than a high school education with some typewriting skill is rarely required. A recent study(1) of systems analysts, on the other hand, showed a predominance of males. Only one out of the 102 who were interviewed was a female. Females were rarely seen in the data processing rooms except as key-punch operators or clerical assistants.

Systems Analysts

The dominant role in the data processing department is held by the systems analyst. The study conducted by the writer in 1963 which included interviews with 102 systems analysts in 80 industries and 11 states resulted in the following information about systems analysts.

Skills and Knowledges

Skills and knowledges analysts reported using while working on systems projects are, in decending emphasis

1. Knowledge of the company; what the divisions do and how the company operates; knowledge of competitive aspects of the business, the product, and of the production process; how customer contacts and sales are made; and the effect on a customer of service and order handling.
2. Systems and procedures analysis skills: Flow charting and diagraming, systems design, and system implementation.
3. Knowledge of electronic computer equipment, knowledge of how to put information processing systems on the computer, and knowledge of company information input and output requirements.
4. Knowledge of accounting procedures such as payroll, inventory control, and stock transfers. Knowledge of costs, especially costs of present systems.

Less frequently mentioned but still significant requisite skills and knowledges were

Organizational analysis and planning

Analysis, simplification, or establishment of operating systems and procedures

Work simplification

Time and motion study and incentives, usually in the clerical or "office" areas

Procedure and manual writing

Forms analysis, design, and control

Records management

Space and facility planning and control of utilization

Report analysis and control

Equipment evaluation and selection; standardization

Those who design information flow systems in today's giant corporations are called systems analysts. They are recent arrivals on the corporate scene. They are staff men, information processing specialists, and technicians. A good analyst knows better than anyone else in the company how to study information flow systems, how to design them, and what equipment is available for mechanizing and automating them. Compare information flows within a business group to pipe lines in a house, and you can liken the system analyst to a master plumber. Compare them to the arteries of the human body, and you can liken him to a doctor. In large firms, the trend is to give systems analysts authority to analyze systems throughout the entire organization, including production systems.

A high-level analyst is concerned with all aspects of a company's information flows: equipment and supplies used, costs, forms, methods, personnel, duplication of effort, use made of the information, layout of work stations, standardization, coordination and simplification. It is a mistake to think that analysts are concerned only with accounting or computer systems.

In 1956, the National Board of the Systems and Procedures Association(2) released a statement which described the range of systems work as follows:

Systems work is defined as a professional type of staff work concerning the research, analysis, development, problem solving, and assistance to management in the following areas:

1. Knowledge of the theory of organization and the climate of management systems.
2. Knowledge of statistical methods, sampling techniques, and equations.
3. Knowledge of forms design.
4. Knowledge of clerical procedures and personnel. Knowledge of how to coordinate the clerical effort with the over-all systems effort and measure its productivity.
5. Knowledge of procedures writing.
6. Knowledge of company personnel in general: what they do, employee benefits, and how to deal with others to enlist cooperation and to communicate and sell ideas.

Eighty-one of those interviewed were college graduates. Forty-eight had degrees in business administration. Six were industrial engineers; 6, economics; 5, English majors; 5, psychology; 3, political science; 3, mathematics; and 1 each in geology, speech, agriculture, education, and law.

The biggest subject-matter concentration was accounting and recognition of its importance in analyzing and designing business information systems was generally conceded. Accounting, it was said, is still the language of business. Analysts who had not had accounting courses in college reported taking correspondence courses and special night courses.

Experience. Experience with the company in which the analyst was working when interviewed ranged from 1.5 years to 30. The mean average was 8.5 years, the mode, 3 years. Nearly half of the analysts interviewed had worked before joining their present companies. Total work experience reported with other companies ranged up to 29 years. The average was 13.

From the above, we see that systems analysis is not an initial job. Even junior analysts are likely to have previous company experience.

Systems Projects. Although the majority of the analysts interviewed were working with computers, some were working on such things as forms design, filing systems with a microfilm, subsystem clerical work measurement, procedures writing, office space utilization, and training programs. Forty-four reported acquiring computer experience within their present company, being aided by computer-company representatives. Some computer projects on which they were working were described as follows:

1. Computerized accounts receivable and credit from a punched-card system.
2. Converted a payroll system to a card-tape computer system.
3. Centralized data processing from branch offices to the home office.
4. Converted a manual health insurance record-keeping system to punched cards and redesigned the forms for compatability with the punched-card system.
5. Put a promotional name-and-address list onto magnetic tape and tied the system into sales information flows.
6. Developed a procedure for processing stock certificate records.

7. Converted sales data from a punched-card to a magnetic-tape system.
8. Automated a data-transmission system for material received from vendors.
9. Designed an integrated order-entry system, using Friden and teletype tapes.

Most of the analysts were deeply concerned about the total-systems concept. Since it was referred to again and again as the ideal long-range goal, it seems desirable at this point in this paper to describe what this concept is and how it is affecting "office" work.

The Systems Concept

The enlarged internal complexity of organizations today (the vice-president of one company told the writer his organization has 23 levels of management) has greatly increased the problems of intra-organizational communication, integration, and management. Managers of the large industries and divisions of government need a new philosophy and methodology that will provide integration, simplification, unification, and logic within their operations. The emerging concept which its disciples hopefully believe will meet this need is riding on the shirttails of the computer and is called "management by systems." Management-by-system is a new philosophy. It is a methodology for combating complexity in business management. It is a unity concept.

A system--any system--is an array of components that interact to achieve some objective. The basic idea of management-by system is that a business organization is a system of inter-related parts, directed and controlled in their inter-action by that ubiquitous and cohesive element, information (the sap and yet the glue of the system) and that a careful study of the over-all system should reveal its inner logic and rationale. Further, that once the system's logic is known, the information the system generates should--for maximum utility--be electronically processed and merged with information from other management information systems. Management-by-system sees an organization as a series of inter-acting management information systems.

The components of a system may themselves be systems, depending on the complexity of the structure of the parent system. Sub-systems are in turn composed of procedures which control information flow patterns within a business organization, because they describe the specific nature and timing of each individual's participation in the system.

A business organization is composed of many layers and types of systems and procedures such as production and materials-handling systems, finance and budget systems, and personnel and training systems, and industrial engineering systems. A big organizational system is somewhat like a universe with solar systems, planets, and satellites. As an example of a man-made organizational universe,let us look at a state university "system."

A large state university has many solar systems in its separate "schools" such as the medical school, the law school, the education school, pharmacy, music, nursing, dentistry, engineering, public health, liberal arts, natural resources, social work, business administration, etc. Each school may enroll several thousand students and employs several hundred faculty, assistants, and office staffs. Following along on the analogy, if the total university's organizational system is an universe and its separate schools are solar systems, then the division within a school can be compared to planets. For example, a school of natural resources may be divided into conservation, fisheries, forestry, wildlife management, and wood technology.

The systems of the schools are served by yet another set of systems--campus-wide administrative systems such as plant and grounds services, purchasing and stores, internal audit, property control, personnel office, staff benefits, information and news services office, business office, attorney, investment office, audio-visual center, payroll office, etc. Each school further has satellite systems of libraries, observatories, laboratories, museums, graduate study programs, research bureaus and foundations, endowments, scholarships, and special programs. In addition, there are such special university-wide systems as board for control of student publications, university press, alumni associations, extension services, institute of science and technology, survey research center, institute of labor relations, council for religious affairs, office of admissions, the international center, dean of men's office, a student health center, registration and records, summer sessions, university medical center, etc.

The sub-systems that make up each school are grouped first under a dean who reports to a vice-president of faculties. Other groups of ancillary systems are directed by a vice-president of university relations, a vice-president of student affairs, a vice-president of research, and a vice-president of business and finance. The integration (interfacing) of each school's system with other university systems depends on the deans. Under the systems approach, integration is a fundamental concept.

Complex organizations are all moving toward integrated systems thinking. At first, the high cost of computer installations made integration a practical necessity. Now, the systems concept is causing management to go one step farther and examine its philosophy about organizational patterns, controls, authority relationships, information flows, and waste in information utility. System, whether applied generally to the inter-facing of parts of a complex organization or specifically to the electronic data processing of accounting, is ruthless in its insistence on analysis, logic, and detail. It demands clarity.

Changes in Data Processing Concepts

We observe then that important changes are occurring in business management philosophy as well as in the operation of office work. Prior to computer storage of data, for example, each department, office, or desk had its separate files of pieces of paper. The computer, however, with its huge storage memory, and its ability to retrieve and manipulate data at the speed of light says, "Get rid of all those pieces of paper, that duplication of records, and that confusion. Make your systems compatible with my equipment and store needed data in me. Let me automatically update and merge your "decks" of data. I can do it more accurately and more rapidly than any human being."

The widespread use of electronic data-processing systems, then, has created a climate for a progression of changes. From computerizing accounting systems we have progressed to analyzing all kinds of systems. The college-trained systems analyst is professionalizing business systems research. A whole new technology is evolving--information processing technology based on the scientific method as well as the total system philosophy. New developments in the computer and in peripheral data processing equipment have extended the dimensions of the new technology into such areas as character sensing, on-line and off-line computer devices, inter system links such as data-phones, and electric retrieval of graphics. Information in organizations has become too valuable a commodity to be left to poorly motivated, female high-school, typing-oriented employees. In some ways, the transition can be compared to the transition in transportation from the horse and buggy to the modern jet. The jet pilot has to know a great deal more about his vehicle in order to use it than the buggy driver had to know about his. He has to know what levers and buttons to push and pull on the control panel of the plane, and he has to know about air currents, cloud formations, stresses and straines, and physical features of the environment in which he flies.

Like most transitions which affect human beings, the change-over is being made slowly. It was many years before horses and buggies disappeared from the highways. They are still used satisfactorily and happily in some parts of the United States by some groups such as the Mennonites. Fortunately, the lag in the transition to electronic data processing gives us time to study the implications for business education. Which thought brings us to the last phase of this paper, what are the areas of useful office systems and procedures research?

Office Research

The thread of the story told in this paper so far is that whereas the office traditionally is a supportative role in a business organization to such vital functions as management, marketing, finance, and manufacturing, the computer has added a new dimension to office work--electronic data processing. Riding on the shirttails of computer technology is the new one-system management information concept, and the designing of overall management systems requires knowledges and skills different from those previously associated with office work. It requires knowledge of a total company and of how a company operates as a whole. It requires knowledge of the competitive aspects of a business, the problems of production and marketing, of customer relations, and management processes. It also requires a knowledge of problem-solving techniques, systems and procedures analysis, systems design, and computer equipment. These things are not taught in the high schools and are not likely to be. We see, therefore, that a new level of office work has evolved--the electronic data processing level. This new dimension has more status in a company than the administrative services "office" ever had. The traditional office function we see as having become supportative even to computerized data processing and as employing some of the lowest paid people in the organization. We see the data processing department with its emphasis on total management information systems employing college-trained personnel who act in a staff capacity throughout the organization and whose salaries range up to $15,000 to $20,000 a year.

Areas of Research

Wherever people work together and with machines, whether in active decision-making roles or somewhat passively as supportative employees, problems of human relations, communications, production, procedures, methods, controls, and machine utilization exist. The psychologist who studies group performance is interested primarily in behavioral and communication aspects and the industrial engineer is interested primarily in production and machine-utilization problems. The professional manager, however, is interested in all of the aspects because his is the job of getting team performance and maximum results from all available resources. To some extent, his is the one-system approach. The business teacher, too, should use the one-system approach, looking at office trainees not only as machine operators for initial office positions but as human beings who want and need to be participating members in the whole business environment. Business students must be viewed in the total setting of an on-going organization built around a total management information system. Specifically this means teaching for understanding such subject matter as

1. The systems concept applied to any environment
2. The concepts of inter-relating parts, function, harmony connective logic, and the efficiency of unity
3. The function of managers
4. The function of administrative services
5. The function of electronic data processing
6. Supervisory skills and supervisory systems
7. Written procedures
8. Forms design, including the designing of punched cards
9. Flow charting information flows
10. The layout of a central file
11. The problem-solving approach in administrative services management

Needed office systems and procedures research then as I see it falls into the following areas: Identification of administrative services; identification of administrative services personnel; identification of specific administrative services procedures and characteristics of good administrative services procedures; identification of administrative services costs; identification of guide lines and controls set by top management for administrative services; a study of written procedures and procedures manuals; and a study of ways of measuring productivity in administrative services.

1. What are administrative services?

That is, let us use the systems approach. Let us look at the whole administrative services system in an organization before we look at such sub-systems as duplicating service, mail and messenger service, and the central dictating-transcribing service. The pattern or hierarchy of studies considered by business systems analysts to be ideal is first the total system, next the sub-systems, then the procedures, and finally the methods. Some analysts contend that there is not much pay-dire in methods analysis unless one is trying to use it as a means of involving operative employees in a participative work-simplification program. This point of view might be considered by business educators especially as they pursue a program of research in administrative systems.

What are administrative services? How are they identified in a company? What are the patterns of organization (centralized or decentralized) and channels of communication (procedures manuals, standard operating procedures)? What specific units or departments are usually a part of administrative services? Under what circumstances, if any, is data processing one of these?

2. Who are the administrative services personnel?

What are the layers of personnel usually found in administrative services departments? What do the in-service training programs, if any, include? What is the average age and educational background of administrative services supervisors; of administrative services managers; of administrative services "operative" employees? What is the turn-over? What are salary ranges? What do the job descriptions say? What are the promotional channels--not as described but as illustrated by examples.

3. What are the administrative services budgets? How much, for example, does a duplicating department cost a company in salaries, materials, machines, and space? In some circles, the status of a department within a business organization is determined by how much that department costs the company. Let's find out how much administrative services cost a company? How much this cost varies from company to company and what causes some of the variances.

4. What policies has top management formed to guide and control administrative services?

That is, what does the company expect from its administrative service manager?

Policies establish courses of conduct and determine objective, scope and status within an organization. What is the usual scope of administrative services in a company as defined by management policies? How does this scope differ from company to company? What are some of the things which cause the differences? Who sets the policies for administrative services? How are they approved and modified? Are they published and distributed? What amount of discretion is usually allowed in interpreting and applying them? Are policies about administrative services usually included in a company's corporate policies and procedures manual?

5. What are some specific administrative services procedures?

What are the patterns of administrative services procedures? How do they differ, if at all, from manufacturing or sales procedures? What is the usual mail-handling procedure in an organization; central services dictating-transcribing (not personal dictation) procedure; central services transfer-disposition of records procedure; request-for-purchases procedure; request-for-duplicating procedure; and forms-review procedure? How can these procedures be improved?

6. What are the characteristics of a good administrative services procedure?

What criteria can be developed for measuring the effectiveness of an administrative services procedure? Can the concept of service within a company be quantified? Can a mathematical model be developed and tested as a formula for determining the effectiveness of administrative services within an organization? What are some service-concept variables? How can administrative services be geared to meet management objectives?

7. What types of administrative services procedures have been written?

Written procedures have become a necessary communicating device in today's complex and far-flung business organization. Most organizations have some written administrative services procedures. A collection and analysis of these needs to be made. Are they good procedures? How are they different, similar? How often are they revised? Who writes them? What standard format, if any, is preferred? What does a procedures manual usually contain?

8. How can administrative services productivity be measured and improved?

Assuming the hypothesis that productivity is the ratio between input of all resources and materials to output of finished units, what procedures can we develop for measuring the productivity of the mail room, the duplicating room, the central files, the central stenographic pool, the central dictation-transcribing room? Let us undertake some productivity studies. How many people are necessary to staff an office or service facility to provide a given level of service for a given demand?

9. How can administrative services systems and procedures analysis case materials be developed?

One of the best ways to teach administrative services content is to involve students in cases which simulate real problems such as: the development of an administrative services organization within a company; the design of forms used in operating a service department; the flow-charting of information, control, and reporting systems; the design of related filing systems; and the determination of mechanization including maintenance and repair contracts. Harvard conducts a case-development workshop wherein educators write a case. The cases are published and distributed at 10 cents a copy. Two things result from this project; 1. a collection of well-constructed cases is made available to educators, and 2. participating educators learn how to write as well as use cases. To my knowledge none of the cases developed at the Harvard School of Business is specifically about administrative services.

10. Miscellaneous office research emphases:
    a. What is involved in getting maximum results from the administrative services function?
    b. How can administrative services employees be motivated?
    c. What is the function of a records management department?
    d. What is the function of the printing, duplicating, and reproduction department?
    e. What is the scope of the building services department, the office layout and space planning department, the purchasing department, the mail and messenger department and the stenographic services department?

The first area suggested for study is, I think, and essential underpinning for any subsequent pyramid of office research this group here assembled hopes to develop. It is essentially a study of what administrative services is, its organization and scope.

If we, business educators, ever hope to build practical office-training curricula and meaningful subject matter for these curricula, we must find out for outselves--first-hand--what is involved. We must do our own observing, searching, and interpreting. Except for an isolated study here and there, we have depended entirely on hearsay, supposition, unstructured observation, businessmen's talks, and magazine articles for our image of administrative services and data processing. Obviously, we cannot build sound curricula on such a foundation. We must know the facts, and assay the situation as only business educators are qualified to do. We are the only ones qualified to determine accurately office-training course content and teaching needs, because we are business education professionals. We know how to marshall and examine facts through objectively structured research. Such training was a part of our terminal-degree programs. It may be that this fact is not recognized outside our own circles and if it is not, this is our own fault. A program of office research such as is being contemplated here at this workshop is in my opinion one way to make managers and administrators aware of our stake and role in the total business administration "system" and is a way to educate them to what we have to contribute to the continuing evolution of office systems and procedures even if we don't get onto the electronic data-processing merry-go-round.

I recommend, therefore, that research which identifies the scope, nature, funding, and specified objectives of administrative services should be the first phase of any program of office systems and procedures research developed at this workshop. Confucius is reported to have said that every journey begins with a first step and in any business problem-solving situation, the first step is to know the situation--the problem setting, the costs involved, job descriptions, equipment used, the skills and knowledges used.

Some Extant Studies

In conclusion, I want to acquaint you with the nature of some information-processing procedural studies now being pursued by both engineering and business administration systems and procedures students in Ann Arbor. These students are primarily masters candidates and the main objective of the courses (given in both the Engineering

School and the School of Business Administration) is to give operational problem-solving experience. Weekly progress reports are required from each project with the objective of the study very clearly defined. Students are indoctrinated with the total-systems concept and with the "scientific" problem-solving method. Most of them are knowledgeable about computer technology and have some background in statistics and in handling linear equations. Each study terminates with identification of alternate solutions. Frequently cost data, personnel requirements and changes, as well as procedural changes and total system affects are specified in these solutions. The engineering students are particularly adventurous about their problem-solving ability in the administrative services area. One student put it this way,

> How's come business educators haven't researched this area. From a production and management point of view, office workers have been getting away with murder. You can go into an office and do studies right and left. If you have a hunch about a problem area, start first with the objective of the entire office (the systems approach) and work backwards. What are the best systems and procedures that will help the office meet the objective. In the long run, office systems analysis is the process of eliminating waste and increasing productivity; it's the practical problem of maximizing resource and manpower utilization. The short-run point of view, however, might be to cut costs in a particular unit, improve service, simplify procedures, cut personnel, standardize, or mechanize. It sure is a wide-open area for applied research.

Many of the studies on which the students are working are in hospital systems because this "industry" is currently very interested in having our students search here and there throughout their organizations to see what they can turn up. The following are currently in process:

1. A space-utilization study of the purchasing function of X Company.
2. A procedural study of the purchasing function of X Company, including forms design and reporting.
3. A systems study of a centralized purchasing office with emphasis on policies, controls, and integration of purchasing data with inventory and materials handling data.
4. A systems and procedures analysis of a central reproduction department in X Company with emphasis on scheduling procedures, machine utilization controls, and a sub-system of prorating costs back to departments served.
5. A systems study of the input, processing, and output activities of the medical records room of X Hospital.
6. A systems evaluation of storage facilities and materials movement in X Hospital.
7. An information flow study about job descriptions and organization in the maintenance department of a public school system.
8. A study of the relation between the nursing-staffing system and record-keeping procedures at X Hospitals.
9. A bed-availability study with emphasis on the admitting procedure and the information flow system from the floors to the central admitting office.
10. An economic study of the clinical linen handling system.
11. Organization, staffing, scheduling, and methods improvement of the patient dietary-service system in X Hospital.
12. A procedural study of patient room-equipping and maintenance practices.
13. A heart-station procedural study.
14. The design of a preventative maintenance system in a metropolitan school system.
15. A materials-flow system study as part of a warehouse manpower utilization study in the X public school system.
16. A systems and procedures analysis of the bookstore maintained as part of the university lawyer's club.

17. A systems study of the law school's admissions standards and procedures.

18. A systems study of the utilization of secretarial services in the law school with implications for redistribution and for a system of controls.

19. The design of an order-processing system for medical doctors through a visual input-output device "on line" to a central computer inventory-control system.

20. A systems study of the office of residence halls as a static organizational structure.

21. A filing systems study at The Center for the Study of Higher Education.

The main criticism of the types of operational systems and procedures studies identified above is that they rarely continue beyond one semester (15 weeks) and must necessarily be "quickies." It takes several weeks of background reading before the study itself is structured so that students rarely spend more than ten days (a full day once a week) gathering data and observing the real problem area. The Engineering School has developed a student systems and procedures consulting service and students who do well on initial studies can be invited to pursue studies in more depth at $1.75 an hour plus travel expenses (9 cents a mile) and a $1.50 lunch allowance. The funds are supplied by the participating companies. There is no reason why a business teacher-training center that wanted to give its students this type of problem-solving experience could not develop a similar "consulting service," providing a faculty member had time to administer it.

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Paper 3

EDUCATION AND RESEARCH NEEDS IN RECORDS MANAGEMENT

Belden Menkus

Records Management is well into its third decade as a functioning administrative tool. Where properly applied, the distinctive Records Management philosophy and techniques can materially aid effective administration in business and government. Yet Records Management is poorly understood and inadequately used by most modern managers. There are many reasons for this situation, including the lack of an adequate supply of properly trained Records Management professionals and technicians; failure of business education courses to properly orient potential clerical people to the use of Records Management concepts and tools; as well as the joint failure of practitioners, educators and manufacturers to join hands in developing new tools and techniques and in refining already existing ones.

Records Management is a wedding of the archival and systems design arts. In fact, it derives from the efforts by National Archives personnel early in World War II to systematically deal with the sudden tide of paperwork inundating Federal agencies. Records Management was later introduced in business by people who had helped develop and operate the Federal Government program. As Records Management has matured, it has drawn upon many concepts inherent in the developing systems arts.

Records Management is concerned with captured information rather than with data manipulation techniques and equipment. Records Management deals with information capture methods and the form in which information is captured - from creation to destruction.

Though Records Management program development and installation usually begins with what might be loosely termed garbage disposal - crash effort preparation of records retention procedures and disposition schedules - it can be more logically viewed in another fashion - in terms of instituting controls over records creation, records maintenance, and records disposition practices.

Creation and maintenance of records involve an investment in communication. Information is captured in usable (essentially human readable) form as a means of communication. Records are kept as a means of insuring accurate recommunication of information. Records Management seeks to derive maximum return on the investment made in this communication and recommunication effort. Records Management challenges the traditional administrative assumption that these communication costs are - along with such things as the telephone and janitor expenses - a part of normal operating expenses. It seeks to reintroduce concepts of quality, clarity and cost control into these communication efforts.

And, as administration rather than operation or production becomes the dominant aspect of organizational activity, these communication efforts will be a major cost segment. Despite present and planned advances in computer technology, communication costs will not disappear nor even be materially reduced in the foreseeable future. Computers simply alter the forces creating these costs and the records related to them. (It is significant that the person selected to coordinate Federal Government Computer use is a long time Records Manager.) Adoption of time sharing and other computer concepts will spread organizational contact with and dependence upon EDP, but this will not change the fact that for well into the years ahead administrators and clerical employees will in most work situations continue to deal with some form of conventional records and records keeping problems. Computers will expand rather than diminish the Records Management function.

The Records Creation aspect of Records Management deals with correspondence (and by derivation telecommunications content) forms, reports and directives.

The correspondence problem is two-fold-assurance of clarity and brevity in content - and achievement of economy and accuracy in production. Solutions lie in challenging traditional correspondence concepts. The communication techniques developed can also be used in resolving reports and directives problems.

It is long past time to abolish the complex verbosity of so-called Business English. If the message can be communicated in three sentences, there is no reason to try to say it in three pages. Clarity and compact statement demand use in letters (and in teletype messages and telegrams) of simple words gathered into simple sentences. Verbal pretension and confused statement cost money.

Heavy business and government investment in correspondence improvement programs underscore the inability of most Americans to write an adequate sentence, leastwise a communicative letter. By the time they leave school, most potential clerical employees have been so fully exposed to the verbose sample letters in shorthand and typing texts that they are unprepared to draft a reply to the simplest of relatively routine letters.

Cost and quality consciousness need to be introduced into correspondence creation. There are no adequate cost yardsticks for correspondence, telecommunications, reports or directives. Figures generally used are at the very best badly informed guesses.

It is not unusual still to find correspondents dictating essentially the same letter repeatedly in such mass paper producing operations as collections functions. Guide letters (predrafted standard paragraphs and letters) and well designed form letters can cut correspondence production costs. Post cards can be used for brief standard replies. Business reply mail can be used to secure prompt replies. Standard forms can be built into standard form letters. And, of course, many other techniques can be used.

Yet, administrators and clerical workers must still be taught such basic things as not all letters need to be written and copies do not need to be kept of all that are written.

Forms creation control involves analysis of repetitive information needs, identification and arrangement of information items in logical sequence, as well as securing the quantity needed in the best condition feasible at the lowest price possible.

Forms analysis and design principles are surprisingly simple. Business education should introduce students to them. Surely, no one should complete a typing course who has not demonstrated an ability to produce a satisfactory form with a typewriter and a ruler. (Of course, I have yet to see a business education text that adequately treats even the rudiments of modern forms design.) The office worker must have some knowledge of duplicating and reproduction processes and techniques. The small offset press and the desk top copying machine are as much standard office tools as the typewriter and the ballpoint pen. Yet, too many clerical workers enter an office situation well able to cut a stencil but unable to properly prepare an offset master or to even understand the duplicating processes involved.

Proper use of adequately designed forms, together with realistic and efficient forms procurement techniques, will sharply cut information gathering costs.

Together, reports and directives form an organizational closed information loop. Directives send information from management down into the organization and reports bring information up from the organization to management - and may at times bring about revision in the directives.

As relative clerical turnover increases, most administrators are forced to maintain a continuing training program. The directive must be a major training device. It should tell the worker and his boss what is to be done and all that must be known to satisfactorily do the job. It must be as straightforward a communications tool as the letter we discussed earlier.

Efficient reporting has been almost as neglected a function as the development of effective directives. Much remains to be done to improve statistical, progress, production and other data oriented reporting practices. Cost and quality standards must be developed. And, something constructive must be done about the narrative report. It is an easily overlooked management decision tool that is too often presented by educators as though it were nothing more than a stripped down dissertation.

Form is emphasized to the detriment of content. As a result, most narrative reports are too long, verbose and obscure to be fully useful to management. For instance, too little emphasis has been given to having a narrative report (or a directive) show the reader, rather than tell him, the message. Both communication forms can benefit from the use of simple illustrative methods that can be easily learned, and that should be taught in basic business education courses. Of course, the object is not to train a commercial artist but to prepare the clerical worker to make the best use of all of the available office tools.

The key problem is information content. Reports, directives, forms and correspondence share a common key to efficient use. The adequate information capturing medium tells the user only what he needs to know - and nothing more.

Modern management is too often simply gadget happy and seems convinced that if it has the right information (really, data) handling gadgets, its problems are solved. Thus, for just one instance, many organizations are investing heavily in vast teletypewriter message transmission and switching systems, and giving relatively little attention to the utility or value of the information being sent over that system.

If educators can help management rediscover the importance of information - as against techniques and equipment for manipulating that information - they will have immeasurably helped the progress of the administrative art.

Information, of course, is recorded to be used. Records are created to be used. Records Maintenance is the most widely known aspect of Records Management. It involves the basic filing skills (and by derivation of emerging information retrieval techniques), use of microfilm and videotape microimage recording processes, and source data automation and mail management methods.

Filing is one of the most widely taught clerical skills. Most of the teaching is less than adequate. Check a half dozen or so high school or business school filing courses in a given community and you will find that each is using a different text in a slightly different manner. Join with a number of Records Managers in the area to suggest that these instructors work together to develop consistent course content (to assure that prospective employers have some measure of the skills possessed by students from these courses) and be strongly rebuffed by the instructors. Spend several weeks auditing these courses and come away convinced that while there is little that the public school student can do, the young people who paid tuition fees should sue the business schools for fraud. And, you can then do as a surprising number of business and government organizations have done - develop and operate your own filing training course.

Part of the problem is in the text and teaching materials currently used. Many of the texts have been little changed in twenty or thirty years. Courses still teach fastening of files when, for many years, almost all filing has been done without fasteners. Courses still teach preparation and use of elaborate cross referencing techniques, when most filing installations today are consciously designed to reduce cross referencing to an absolute minimum, and to allow for maximum use of multiple copies of the basic document in place of special cross reference documents. Courses concentrate on alphabetic or geographic arrangement systems and almost totally ignore subjective or content oriented systems. (I strongly suspect that this lack stems from the difficult problem of constructing standard objective tests for subject file course content.) Yet, an increasing number of filing installations are subject or content organized. And, the growing information retrieval field has an increasing need of workers trained in subject or content concept filing techniques. Courses are presented in the context of large centralized file operations with workers concentrating on specific duties, when most centralized file operations are going, or have already gone out of existence. And, of course most of these courses do not expose the student to the realities of maintaining records in a modern organization. In short, filing courses and texts are training students to do jobs that no longer exist or to perform tasks that are no longer relevant.

Conceptually most filing texts are extremely weak. They emphasize use of specific techniques and almost ignore concepts and philosophy. It might help most teachers to explore the archival roots of Records Management to discover such concepts as the series.

Ideally anyone who satisfactorily completes an adequate filing course should be properly prepared to work in an information retrieval installation. Scientific, marketing, financial, legal and other types of information pour into most organizations in a seemingly endless flood that has overwhelmed many traditional library and file operations. Conceptually information retrieval is an attempt to systematically identify discrete segments of information content so as to permit organized analysis, comparison and selective recall of information resources. Present information systems tend to be elaborate and obtuse. Principally this comes from the domination of this field thus far by theoretical mathematicians. Instead of creating flexible, realistically operating integrated systems, most of the efforts have simply increased finding times and the number of places in which a given information item might be located. Educators will materially help management if they can effectively participate in efforts to redirect information system development efforts towards more realistic goals and methods.

Key tool in almost all information system efforts has been reduction of documents and abstracts of their contents to microimage form. Roll microfilm has been used widely for several decades as a quick means of mass reduction of record bulk.

Initially it was used by banks to record check clearances. In recent years microfilm makers have emphasized use of microfilm as a means of reducing records storage costs. Yet, this approach to cost reduction is deceptive. Depending on the nature, condition and volume of the records involved, it is possible to store them in a modern records storage center facility for as little as 12, or in some instances as many as 60 or 70 years, for the cost of microfilming the records.

Interestingly, the banks have begun to realize how expensive mass microfilming of documents can be and some have recently begun to eliminate microfilming - or the keeping of any other sort of record - of check clearances.

Microfilming may be economically impractical as a records storage device, but microimaging can be effectively used in lieu of adding or retaining documents as a part of the paperwork processing cycle. These systems uses of microfilm are surprisingly simple concepts and should be presented to students as another of the basic office tools.

Microfiche are multiple microimages embodied in cut film of standard index card sizes. They offer many opportunities for reducing the bulk of information handled in the office. One microfiche service provides reduced copies of manufacturer catalogs for purchasing use. The modern office is a publishing agency and it can use microfiche to reduce a parts catalog or supplies listing from, for example, 30 or 40 pounds of paper to several small pieces of film.

Microimages were first mounted in machine tabulation cards as a means of reducing and standardizing files of engineering drawings. However, this technique for manipulating microimages embodies indexing and sorting capabilities that are readily adaptable to simple information retrieval applications-such as contract or project files - that should not require specialized clerical operator training.

By the same token, many of the concepts implicit in systems use of microfilm are inherent in the field of source data automation. Too often management tries to use a cannon where a mousetrap would do just as well. Too many computers and telecommunication networks are used where simpler and less expensive source data automation techniques would serve as well - for far less.

We have defined records as devices for capturing information. Source data automation seeks to pare information capture and recapture costs by using such non complex media as machine tabulation cards (entering information in some instances with portable keypunch units), plastic tokens similar to conventional credit cards, and punched paper tape produced as a typewriter byproduct.

Educators should assure that potential clerical workers understand both the source data automation processes used and the techniques for using them. These, too, are among the new office tools.

Records Management is concerned with all aspects of information handling. And, as the administrative aspects of an organization grow, the problem of handling mail grows with it. Surprisingly, inexpensive and too often overlooked by business executives, mail management methods offer excellent opportunities to cut easily mail processing and distribution costs. Such techniques as organized messenger services, controls on postage costs and mail station addressing systems are among the things that will be taught to young people being prepared for administrative careers, rather than relatively deadend secretarial or clerical tasks.

If a record has been properly created and maintained, the question of its ultimate future will be easily settled.

The Records Disposition aspect of Records Management is wrongly identified by many executives as being the total area of Records Management operations. It is in reality only a means of tying together what has already been done. Records Dispostion involves analyzing and classifying records materials, developing rules for their orderly separation into materials to be destroyed and materials of value to be kept, establishing and operating archival and records storage center facilities, as well as protecting vital operating records.

We have already pointed out that every record that might be created does not have to be created. We can well add that a copy does not need to be kept of every record that is created. Educators will make a notable contribution to relieving the paper glut in most organizations if they will stop teaching potential clerical workers that a carbon copy must be routinely made and kept whenever a document is created.

Procedures for systematic Records Disposition reflect the archival heritage of Records Management. Any consideration of the ultimate fate of records must begin with a systematic appraisal of their value in the light of the legal, financial, administrative and historical needs of the organization. Scheduling techniques employed are adapted from traditional archival practices.

Objectivity will assure that records of short term value are identified for prompt disposal. Planning the final disposition of many record types requires a careful balancing of many varied factors. Basically management must realize that there is a calculated risk in destroying almost any record. The cost of keeping (and, in some instances, the cost of creating) a record must be balanced against what failure to have the record available at a later date will cost the organization. There is something simply distorted in spending several times that amount, for example, to protect yourself against a possible total loss of $5,000. Also, management must learn that there is nothing criminal in admitting that information is no longer available on a certain matter because it has been destroyed as a part of the normal business routine.

Finally, management must rediscover that the *statute of limitations* means not that you must keep a record for that period but *only* that you can be sued about the content of the record during those years. Again the element of calculated risk enters into ultimate decisions on the future of records.

Records retention schedules must be tailored to fit the needs of a specific organization. Published so-called *standard schedules* represent inadequate research combined with a large measure of *guesstimation* and are of little more than general guidance. Legal and accounting people are of surprisingly little help at present in preparing realistic and efficient schedules. Basically legal and accounting views of record keeping concepts and functions have not materially changed in centuries. Sophistication of computer technology will force drastic changes in these views.

Quite simply, it is possible through the scheduling process to meet reasonable legal and financial record keeping needs and, yet, to systematically dispose of the bulk of the records created or accumulated by an organization.

Of course, for various reasons, some records cannot be disposed of immediately. Yet, they are so infrequently used in the course of daily business that the high cost of keeping them in conventional filing equipment in active office space is not justified. The records storage center provides a comparably low cost home for these materials. This warehouse like facility provides bulk storage of records, generally in a simple corrugated carton on a shelf. Records are available with surprising speed and accuracy of reference. Records are handled and destroyed en masse.

An archival establishment can be operated separately or in conjunction with the record storage center facility. The archives, despite its formidable connotations, retains the essential raw materials of organizational history. Most educators overlook the fast developing field of organizational history and ignore the growing job potential opportunities in this area. Surely the student should be exposed to this aspect of office work.

Finally, a properly functioning vital records protection activity can be an adjunct of both the records storage center and the archives. It is a facet of the overall civil defense protection but it attempts to so specially protect those few records identified as essential to continued satisfactory operation in an emergency, that it helps prepare an organization to successfully survive any natural or man made disaster situation.

Surely this overview will introduce you to some new facets of Records Management. It seemed wise to attempt this approach after the author of one of the most widely used texts on office operations admitted that he didn't know what Records Management was.

Records Management will become in the future a more widely used management tool. Increased emphasis will be given to improving the utility and effectiveness of reports and directives. Records Managers will concentrate more on measuring paperwork quality, as well as quantity.

The great strength of Records Management to some measure is its great weakness. Records Managers are long on pragmatism and operating techniques but short on philosophy.

For the future, Records Management needs all the help that it can get. You can start almost anywhere. There is no adequate text on the entire field. And, satisfactory texts are lacking in several component areas. The bibliography with this paper gives a selection of some of the better volumes now available. No attempt has been made to include the periodical literature.

Educators can take the lead in research in this field on any number of fronts. For instance, there is no adequate standard subject file system. And, there has been no major standard file system developed in well over 30 years. Again, there has been no major filing equipment development since before the turn of the century. The much touted shelf file conceptually is nothing more than the old letter box file with the back removed.

And, finally, where should we go next? The best thing might be simply for both Records Managers and educators to get to know each other better.

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Paper 4

TRENDS IN OFFICE MACHINES

Eugene F. Murphy

The tremendous scientific and industrial advances made by man in the last two decades are largely the result of comparable increases in his information handling capability. The most obvious example of that increase is the electronic computer. The office equipment field has expanded and elaborated on these advances which originated in scientific fields. Today, new product lines which were non-existent in 1950 are largely responsible for our industry being the fastest growing in America. In fact, at the present rate, it is doubling every five years.

In order to train personnel properly to understand, use, and operate the office machines of tomorrow, which they will encounter when they enter the business world, it is necessary to appreciate business machine trends.

In addition, there are some things that you should know about the office equipment industry in order to evaluate changes in the equipment and procedures we anticipate for the years ahead. You will be interested in knowing, for example, that it takes about five years to develop a product from engineering concept to production and that, considering the pace at which these developments take place, the life of some new products is shrinking to less than five years.

Two major developments are affecting our business today. First is the electronic replacement of mechanical parts. This trend has an immediate effect on the cost of going into production and/or the price of new products. For example, there are 3500 parts in a rotary desk calculator, and tooling for these parts costs millions of dollars. This high cost of entry into the calculator market has kept many companies from entering this and similar businesses. A circuit board with inserted, purchased electronic components can replace a large number of these mechanical parts. The associated tooling expense is measured in hundreds of thousand dollars, rather than millions. Consequently, it becomes practical for companies with good distribution, marketing, and electronic service facilities to move into these previously sacrosanct businesses. Second, plastic parts can be molded to a degree which permits them to safely assume shapes that enable one plastic part to replace several metal parts. As you might imagine, one plastic injection molding machine can do the work of a number of machine tools which would perform drilling, stamping, milling, and other metal-shaping functions. Thus, we have a second trend which reduces start-up and manufacturing costs. The implications of these trends are clear; namely, new companies are entering the market place, and a profusion of new products are competing for the business. The older companies, such as Monroe, must compete on these terms.

The result of these new ways to make office machines have also caused a trend toward low-cost calculating, typing, and other office machines. In fact, these low-cost units have become items for the student, the doctor, the lawyer and sometimes even for the housewife. This trend should be of special interest to you in that these products, which are normally classified as office products, are being delivered to the consumer primarily through consumer outlets, such as mail-order houses and discount stores. The obvious premise of the manufacturer and distributor is that the consumer knows how to operate these "office machines."

Meanwhile back at the office, typewriter and calculator functions are being integrated. Thus, there is available a single desk-sized product with a typewriter keyboard which has the ability to calculate, add, and write as well as produce a machine readable output for later processing by computers. This is an exciting development. Here, at one work station, an operator can perform the functions normally done in five or six steps by perhaps five or six operators.

The integration of functions places greater responsibility on the knowledge, understanding, and training of persons responsible for use of such powerful equipments. The result are two-fold: 1) there is and increasing need for understanding the job and 2) diminishing need for high keyboard skills by these operators. For the latter group, machines can assume the logical and decision-making tasks which formerly were part of the operator's keyboard skills. For example, imagine an operator with a file of punched cards or punched tapes wherein each customer's name, address, credit information, delivery instructions, etc. are recorded in machine readable form and another file with a card or tape for each product giving its description, unit price, warehouse location, etc. Then, in order to process an order, it is necessary only to select the proper machine readable documents to produce automatic typing without key depressions of the customer's name, product description, and other data with a minimum of keyboard entry. Extension of prices, including calculation of discounts, taxes, etc., would occur as required automatically at this same machine work station. We see here the changing need in the office from a person with precise skills dedicated to a single task to a person who is more understanding of the general office procedure that he or she is carrying out.

Other subjects of interest to you will be the changes we have noted during the past dozen years in hardware configuration. In 1950, 90% of all adding machines sold had what we called a full keyboard; that is, multiple columns of keys with each column usually consisting of 10 keys for the numbers 0 - 9. The other 10% of the adding machines sold in those days had 10-key keyboards such as you see on the new style telephone. Today, less than 10% of adding machines produced have full keyboards. You undoubtedly know that punch card (key punch) machines have 10-key keyboards even when they have a capability to key and punch alphabetic information. It is easy to project the extension of this trend to other business machines. We might anticipate that accounting and bookkeeping machines as well as cash registers will require 10 key rather then full-keyboard skills in the future.

So far, in the rotary calculator field, there is little decline in the use of full keyboard machines. Operator requirements for them should remain relatively constant, especially if we consider the hundreds of thousands of machines in use today. But, at the same time an increasing number of 10-key printing calculators are being manufactured and sold.

In 1954, when the first electronic computer was introduced to American business, I remember predictions that punch card systems were on the way out. In that year, there were 30,000 companies who used punched card systems. Today, there are over 50,000 users. I bring this up to suggest that progress in the business machine world is evolutionary, and we expect it to remain so. In particular, we are confident that the operation of the typewriter, calculator, bookkeeping machine, and accounting machine much as we know them today, but with an increasing emphasis on 10-key keyboards, will be skills needed for quite some time.

One of the requirements of education which we in the business equipment field are aware of and are preparing to satisfy is the training of high school students and adults to enterthe business world with marketable skills. We are designing teaching tools that teachers need to familiarize the student with today's complex business machines; for example, systems that require handling of punched paper tape and operate under programmed control. An operator of such an integrated business machine work-station will develop an understanding of the overall accounts receivable or payroll function of which she is a part. These are the same tools that can be used by the mathematics teacher to demonstrate the logic and power of modern mathematics or the teaching of vocational computer operation and programming.

This brief attempt is aimed at familiarizing you with some facts related to trends in office machines. You, the educators, should judge how to adjust to these trends. We look forward to working even more closely with you on a continuing basis as the pace in our business accelerates.

Paper 5

THE STATE OF THE OFFICE

Joseph Gawthrop

Broadly speaking, the office, as we generally think of it, has been with us for a long, long time and certainly will be with us for an additional long, long time. Through the years there have been many changes and improvements of various kinds, and this pattern can be counted upon to continue.

In reflecting about the office, or indeed about almost any business endeavor, it is probably well for us to divide the areas which we are to consider into two parts--and I suggest this for what will turn out to be rather obvious reasons. First of all, there is what we can refer to as the "leading edge." This could best be represented by technological advances, some of them quite fantastic in nature, given birth to and shepherded into a useful adult life by the restless, inquisitive mind of man. This leading edge is absolutely essential to all progress; but because of the publicity and discussion it usually generates, it tends frequently to give the general belief that all, or a majority of, businesses affected have at the same time kept up with the technological advances.

Actually, this is not true--so this brings us then face to face with the second stage which we should call the "following edge." This would be that large percentage of people, procedures, furniture, equipment, buildings, etc., which, though not immediately affected by the leading edge, will one day be affected. But by the time this following edge has caught up with the leading edge, there will then have developed a new leading edge which is way out front--so there will always be a large segment of that "collection of things" we call the office which is running well behind in actual practice those advances which are known to be capable of accomplishment.

Modern office technology in the United States has within the last ten years created some amazing machines and techniques. This is good--and certainly necessary. But remembering that something around 80% or more of all business in the United States is thought of as "small business" and remembering, too, that even some large organizations for various reasons feel incapable of "jumping on the bandwagon," it is a fact of life that actual practice in the office will always lag years behind known technical capability.

For example, let me spend a mement or two in taking a short hike down memory lane. Give or take about ten years either way, it was at about the turn of the century when office machines, furniture and equipment first came into any sort of general use. This involved the typewriter, calculator, adding machine, Addressograph, punch card processes, etc. The office itself environmentally was usually rather an unattractive place, dimly lighted, poorly ventilated and certainly a far cry from what exists today. People who worked in the office were looked upon as having something of a "status" job but, by and large, they were at a low wage level which was presumably offset by the prestige that office work provided.

My personal memory is very clear about the year 1931, when I first went to work shortly after graduation from high school. I began as an office boy in a life insurance general agency and not long after that became cashier. My salary was $40 per month (less than $10 per week!) with no supplementary benefits of any kind--but in those days I was one of the fortunate ones simply to have a job. The office where I worked was in a multi-story building which was well heated, had an elevator, and was reasonably well lighted. My equipment consisted of a wood desk, wood swivel chair, electric adding machine and a four-drawer steel file. Other clerks and stenographers in the office used similar equipment, including typewriters and various sized card files. The boss had a rather plush office including a carpet, handsome wood desk and a few other status symbols. These same offices exist today and actually are not much changed over what they were then, except that in some cases more modern furniture has been provided, the lighting has been improved, and air-conditioning has been provided.

In those days, and at around the turn of the century, the ratio of white collar workers or office workers to blue collar workers was quite low. Down through the years this ratio has changed dramatically to the point where in 1956 the combined total of professional, managerial, office and sales workers outnumbered blue collar workers. According to statistics developed by the United States Department of Labor, this rapid growth is continuing and the expected growth in total employment between 1965 and 1975 is 25%, while white collar workers are expected to increase by nearly 33% and blue collar workers by nearly 20%. They expect that clerical workers will be in strong demand and that opportunities will be ample for secretaries and typists, but with a slow demand for file clerks, record keepers and routine machine operators.

Since 1931, machines, equipment and office environment have certainly been improved and have become what is popularly called more sophisticated; but not all offices have kept up with this progress. It is not unusual at all to see offices today with practically the same furniture and equipment that was used 15 or 20, or even 30 years ago. Part of the problem,of course, is pure economics. As long as a desk or a chair remains serviceable, thereis not much point in changing for other than aesthetic reasons, and this holds true for such things as files, storage cabinets and the like. Office machines have tended to be replaced at a more rapid rate because of increased capabilities and a shorter useful life. My office today in 1966 is in a handsome building which was erected in 1929. It was in good style then, and is in good style now. I still have a desk and chair and some files, but they are quite a bit different in appearance and functional design than the furniture I had 35 years ago.

The Home Office of my Company employs about 800 people, and a great many of them are still engaged in some historically typical office jobs such as typing, filing, posting, calculating, sorting mail, etc. To be sure, there are many jobs today which did not exist even 10 years ago, let alone 35 years ago, and some of these require a high degree of technical skill and knowledge and education. These jobs came into being with the advent of the computer and other unrelated but nonetheless advanced office machines and systems.

There have been many changes along the way--for example, security benefits, formal salary administration, reduction in work hours, environmental improvements in color, lighting, air conditioning, building construction, new machines, records management, information retrieval, etc. --and, of course, many more improvements are yet to come. But in spite of all this, scores of thousands of people are still engaged in some of the necessary rudimentary office work which will either never be replaced or which will not be replaced for many years to come.

Business--or "the office" if we can substitute one for the other--is certainly a very necessary thing that actually is responsible for making the world go around. It just appears to be a practical impossibility for all offices everywhere to be eliminated and for there to be no work of any kind. Even in this very sophisticated age of the computer, the computer itself has generated tons of paper, the disposal of which is a major problem. Information and knowledge of all kinds are being produced at an alarming pace, and this of itself has produced still another problem; that is, how to catalogue and store all this information and then how to retrieve it when needed. So the era of the computer (or automation, if you prefer) has thus far, at least not resulted in mass displacement of office workers but rather has seen a continued rise in their numbers.

The February issue of "Fortune 1966" magazine reports an enormous disenchantment with business on the part of "the class of 66" (mostly in eastern colleges) and predicts that only 15% to 25% of them might eventually find their way into business, with many of them doing so only after graduate school. It cites some actual examples as a result of an actual survey of 1965 graduates. Maybe to a degree this is the fault of business in not presenting on campus a proper image, or maybe it is because the current generation is a restless, changing one and has somehow developed a love affair with education with some sort of feeling that they can be students for all their lives or maybe reject business for research or social work or what-have-you. But certainly business cannot indefinitely support this kind of situation, nor could colleges or universities get along well without the corporate giving which so many of them rely upon. The state of affairs is reminiscent of much top business management in India, where education is almost a fetish and where at top levels there exists a large amount of business knowledge which, unfortunately, is too seldom translated into productive action.

My own Company recognized some years ago that the image of the insurance business on campus was rather an incorrect one; consequently, we embarked upon a program of summer internship for rising college seniors. Each summer we have about a dozen of these students in our Home Office for a combination work-study program so as to give them, and through them their college and faculty associates, an accurate picture of what our industry actually is and what varied opportunities it offers.

In our industry and in many others as well, internal programs of education are conducted. Some provide information about a specific business or industry. Others deal with the important subject of the principles and techniques of supervision--in brief terms, how to work with, inspire, and get along with people.

Some organizations have gone the route of insisting that any male employee must be a college graduate. In our own situation, we do not hold this principle, because experience has well proven that young men with either some college or no college training at all can become quite competent and skillful in many phases of our operation. We feel rather strongly that this more or less boils down to the individual himself. It becomes a matter of desire and initiative and personal development. And in all these things our Company tries to help.

In spite of highly sophisticated machines and procedures, the office still turns out to be pretty much just people--and this will probably continue to prevail for a good many years to come. It seems to be true in most quarters that terminations or failures on the part of people come about more from character or personality traits than from lack of skill. This to me points up the need for attention to be given in our educational systems for some sort of instructional preparation in these areas prior to the time a person becomes employable.

All offices would like for their people to have some understanding of basic economics, to have a sense of responsibility, to have regard for the rights of others, to have dignity and sensitivity, to understand our profit system, and to understand in this world of ours that you do have an obligation to your fellow man and cannot be free to do as you please without regard to others. In our training programs we undertake to do something about these things but it would be very helpful if, in particular, our secondary school systems could beat us to the punch and do something about it while young people are still students.

Now what about the future of the office? I am not proud of my ability to make predictions--after all, I predicted that Elizabeth Taylor would be a nun and look what happened! Nevertheless, I would guess that as we go into the 1970's and beyond that certainly the office will benefit by the more advanced development of current equipment and machines, coupled with some rather fantastic equipment which might not yet even be on the drawing boards. This will open up a whole new vista of job opportunities requiring skill and knowledge not even known about today. But there will also continue to be a demand for office workers as we know them today just as there is today a demand for office workers as we knew them 35 years ago.

Of course, there will be changes! Change is perhaps the only constant thing that exists in the office. As all kinds of social and scientific improvements occur--including advances in weather control, the development of strip cities, new uses of metals and glass, changes in transportation and the development of communication techniques--our work time and leisure time will be affected; our manner of dress will change; certainly our office decor will change; and on and on it goes. But in spite of this, there will continue to be the need for people, and these people will undoubtedly have more managerial and supervisory opportunity than ever before.

There used to be a spectre lurking over the horizon, of which we were only slightly aware and not much concerned. But in the last few years this grim spectre has taken some giant strides over the horizon and is very clearly visible in our midst. This spectre is the population explosion which exists in all parts of the world, including the United States. This already existing fact will turn out to be the greatest management challenge the world has ever known. The sheer weight of increased numbers will result either in enormous famine, war, rioting, governmental degeneration or--if we are smart and capable and visionary--an even greater era of enlightenment, world understanding and brotherhood. In all this, it becomes perfectly obvious that necessity for the office and necessity for paperwork will expand tremendously.

In all these things I have a personal interest from the viewpoint of management, natural curiosity and anticipation and so, of course, does my Company. But equally this holds true for the Administrative Management Society of which it was my pleasure to serve as International President two years ago. This is the largest chapter-oriented management organization in the United States and is vitally concerned with not only keeping up with management progress but in trying to stay a step ahead in providing means for its members to become both better informed and more thoroughly educated. As an association we certainly are happy to have the privilege of participating in this conference and will be much interested in the results. It would be a pleasure for us to provide assistance in whatever way we can.

Paper 6

NEW TRENDS IN BUSINESS DATA COMMUNICATIONS

L. H. Southmayd

My role on this panel this afternoon is to discuss with you some of the new trends and concepts in business data communications. These concepts are having a tremendous inpact on the business community. There are three broad areas which are feeling the affect of the changes in data communications.

These are:

1. Management Philosophy
2. Business Organization
3. The Office of the Future

And, of course, all these changes reflect back to business educators. You have a particularly challenging job to anticipate these changes and reshape your educational program as required.

We could easily spend the rest of the week discussing the new concepts in business data communications and their impact. In a brief twenty minutes or so, I am only going to touch upon the high spots and hope that we can develop some additional points with your questions.

The data communications story hasn't received as much attention as it should, in view of the impact it is having. Somehow, the computer story has received so much attention that the growing role of data communications has almost been obscured. We at A. T. & T. are naturally concerned about this, and we've decided that one of the things that was badly needed was a college textbook written for business education. We have just published such a book entitled "Data Communications in Business: an Introduction." Some of you may have just received a copy of the instructor's edition from your local Telephone Company.

Publishing this textbook has been a most interesting project for us. We felt we knew the subject well enough to write a book, but we didn't know how to organize it and present the material for the best use of business educators. To help us on this, we worked very closely with an educational advisory panel. Two of the three members of this panel are participating in this research workshop - Dr. Harry Huffman and Dr. Norman F. Kallaus.

From the initial response, it appears that the book is being very well received. Much of this success is due to the valuable advice we received from Dr. Huffman, Dr. Kallaus and Dr. E. Dana Gibson, the third member of the panel, from San Diego State College.

Just a few weeks ago, the President's Commission on Automation published the results of an eighteen-month study. I refer to the National Commission on Technology, Automation, and Economic Progress, which was headed by Dr. Howard R. Bowen, President of the University of Iowa. The other day as I was reading this report, I ran across this conclusion: "We must look to our universities and engineering schools, as well as to industry, to train a new generation of men who view the processes of production and employment as an integrated whole, with men and machines interacting with each other." ✓

I want to commend Dr. Huffman and others here at the Center for Vocational and Technical Education for arranging this particular research workshop, for I think you are coming to grips with this significant problem of integrating men and machines. Unfortunately, most Systems and Procedures people have only given this matter cursory attention. They need to sponsor seminars and workshops similar to this one. The Systems Designers need the counsel of educators who could forecast the capabilities of people who are going to be entering the labor market. Such a seminar might then continue with an exploration of how new systems could be better adapted to the capabilities of the available people - skills, job content, etc.

You probably have noted that discussion of the "Man-Machine Interface" is popular at Systems and Procedures meetings. I have attended several of these sessions and I am sorry to say that it is primarily the machine side of the interface that commands most of the attention. There is a real need for a better dialogue between educators and systems designers if we are ever to "view the processes of production and employment as an integrated whole with men and machines interacting with each other."

While there is still much to be done in effectively integrating men and machines, there is another related area in which some significant integration has taken place. I am referring to the integration of communications and data processing. This slide will illustrate how these two fields have been converging. It is interesting to trace some of the parallel developments starting with the telegraph and the invention by Babbage of his "difference engine."

One of the first to see the potential of marrying communications with data processing was a group of enterprising engineers in

Chicago in 1933. The problem that confronted them was the slow reconciliation of parimutuel bets at the Arlington Park Race Track.

Before 1933, each ticket seller sold from stacks of pre-numbered tickets. Bettors want to see frequent postings of the changing odds. So, periodically a messenger would run up and down the line of seller's windows to get a count of the tickets sold. The odds were determined from pre-printed tables and the results were marked on a blackboard.

However, this method was much too slow. Input errors were also causing a major problem in balancing and closing out the perimutuel pools between each race.

The engineers devised a system which used on-line communications to control every ticket-issuing machine. When the seller depressed a button to issue a ticket, the information was transmitted to a centralized counter. After the counter had been updated, a signal was returned to the ticket machine which allowed the ticket to be issued. This solved the input error problem. And the concept is still used in all tote board systems today. Now, thirty years later, we are learning all over again that centralized control and on-line communications can solve input error problems.

The largest automatic tote board in the world is operating in New York at the Aqueduct race track. On a heavy day, over one million tickets are issued and accounted for in a 4-hour period of racing.

If any of you are "improvers of the breed" there is no need for me to elaborate on the contribution of the electronic tote board to modern society.

In 1952 we again see one of these significant marriages of communications and computers. This was the airlines "RESERVISOR" system. Ticket agents were connected on line to a magnetic drum containing an up-to-date seat inventory. By pressing a button the agent could check availability and register a sale.

Subsequent developments in the computer line such as solid state computers and simplified programming languages of the COBOL and FORTRAN type were paralleled in the communications field by the introduction of DATA-PHONE Service, Wide Area Telephone Service (or WATS), and Telpak. DATA-PHONE Service permits business machines to "talk" to one another over regular telephone lines. WATS and Telpak brought communications economics to the high volume user and permitted him to do things he had never been able to do before.

WATS is a flat rate telephone service for which the customer pays either a flat monthly rate for as many calls as he desires within a certain geographical area. Or, he may purchase certain minimum hours per month with additional charges for overtime. With WATS, it became more conomical for the businessman to use his telephone facilities to control his operations.

Telpak is a privat line service that provides communications capabilities of various sizes suitable for large volume point-to-point transmission of voice, data, and other forms of communication. Telpak capacities can be arranged so that constitute a group of voice channels suitable for voice or data, or a group of channels suitable for use with teletypewriter speed equipment. Telpak capacity can also be used as a single, large channel for high speed data services such as magnetic tape, computer memory and facsimile transmission.

For years, Systems people have dreamed of a whole new concept of the business information system. At the heart of the system would be a large centralized random access file which would contain all of the essential records for an operating unit. In some cases the operating unit might be an entire company. This centralized bank of information would be available instantly to remote user by data communications, This concept has been called "on-line, real-time."

The direct availability of information to almost any employee would wipe out much of the useless preparation and repreparation of the same information as it passed serially from department to department. Gone forever would be the duplication of records between departments.

There were three major technical barriers to achieving this new kind of information system. These were:

1. A large random access file with fast access time which would be served by an extremely fast computer.
2. New techniques of organizing the file.
3. Communications connecting remote terminals directly to the file - "on-line" operation.

As mentioned earlier, airlines have been handling their reservations operations with on-line real-time systems for many years. However, it has only been in the past year or two that technology has reached the point where these kinds of systems are economically feasible in a wide range of businesses and applications. How many

U.S. corporations are beginning to plan and implement the new generation of information systems.

The Bell System is beginning to implement such a business information system which we abbreviate, "BIS." As it is now, records which carry all information on a customer's service - his name, address, telephone number, equipment, assigned pairs of wires in a central office distributing frame, his credit rating, toll usage, record of service trouble, directory listings and more - are used by many telephone people in several departments and usually in several different locations. Much of the information is necessarily duplicated; the telephone number, for instance, may appear on seven or eight separate records in as many different places. Such repetition of entries obviously multiplies the chance of lack of agreement among records. The problem is further complicated by the fact that the paper records themselves are not uniform among the companies in the Bell System, or even among the areas in a given company.

When changes occur in a customer's service, all the records must be changed accordingly - a process which not only consumes time but also again increases the chance for error. And, information retrieval from such records for all the operating people who need it - service representative, installer, central office man, information operator, billing clerk, directory clerk - can rarely be called current.

The BIS file will be a single file comprised of a number of discretely identified files. These sections will be linked or chained together so that a single inquiry can retrieve information from anywhere in the file. ✓

In batch processing, a particular process requires access only to certain files. In magnetic tape systems these files are pre-selected and mounted on magnetic tape drives in preparation for the particular processing operation.

But in real-time processing, all file information must be directly accessible at all times, because of the random arrival of many different types of requests which must be served without delay. For example, a request for service at a given location should, in itself, be able to generate other information such as a telephone number, wire and equipment assignments, billing information, etc. These information elements may be stored in separate locations in the file system, but must be linked together.

One of the sensitive jobs in the telephone business is that of the service representative. She is the young lady you speak to when you want service or have a question about your bill. She initiates one of the key documents in our business - the service order. There are about 25,000 service representatives in the Bell System who generate about 50 million service orders per year. I think it may be of interest to you educators how her job could change under the new BIS concept.

The customer contact is primarily by telephone. Generally the service "rep" writes down all the pertinent information about the request for service on a piece of scratch paper. She reviews what she has written and then fills out a service order form.

The penciled copy of the service order next goes to a clerk who reviews it for accuracy and completeness before transmitting it to various departments involved. Generally, the service order is transmitted by teletypewriter. Working from the service order, facilities are assigned to provide the service and people are dispatched to perform the work. Records are generated which result in billing to the customer.

With BIS, the service representative can have immediate access to customer records. When the customer gives his telephone number and the reason for his call, the representative keys the number into the computer through a terminal device along with a selective code to identify the type of information desired. The computer immediately displays the requested data, which could include a record of existing service and equipment facilities, directory listing, credit, tolls, repair history, and current status. This dialogue which the girl has with the computer is often referred to as "the conversational mode of operation."

It is not necessary to get to the particular service representative who handles your account and has your file at her desk. Under the new systems each service representative can have access to any customer record. This would greatly simplify the organization of the office and shorten customer waiting time. Conceivably, during a peak of service calls, the representative who handles the request for service might actually be in another city.

This capability of automatically directing a call to an idle service representative at another location gives us much greater flexibility in the way we organize our business offices. For example, here is a problem we have with the present system. We have made studies which indicate that the most effective team size for a business office is about 30 representatives handling some 75,000 accounts. However, this objective of efficiency in team size is at variance with another objective of our company; namely, to maintain close contact with the local community. Under the BIS concept, we will be able to operate much smaller business offices and thus maintain better contact with the local community. When the service representative in the small office is not busy, she is available to handle overflow work from a nearby office.

But what about the service representative herself? In many ways BIS will make her job easier. However, in other ways it may put new demands on the job. For example, she will now have to be a typist. In general, the training that typists receive doesn't really prepare her for the kind of typing she will do. She must type from oral stimuli. Yet, most typists are trained to type from the written page. She must direct the conversation to get the information in the format in which she needs it and type at the same time. And while doing all this, she must treat the customer with the utmost courtesy.

Another element has been addedto the job. The service rep will be typing the order directly into the computer. When she is finished, the deed is done. There is no subsequent checking by a second clerk. It gives her actions a new note of finality.

A recent study of the service rep's job by a team of psychologists concluded that job enrichment and diversification is preferable to job fragmentation and specialization. The new skills required and the new instant access to information in a centralized file are new elements of the job which may contribute the desired job enlargement.

One of the important benefits of BIS will be uniformity in company procedures. If all employees use the same centralized file andthe same computer procedures, it follows that their own procedures must be uniform. This will be a painful thing to achieve, but I think that it will be worth it. For one thing, on-the-job training can be made much more effective. It can be done on a centralized basis with the best of instructors. The instructor may be separated by many miles from his students. I think that you will begin to see business adopt more and more of the techniques of educational television. The New England Telephone and Telegraph Company recently began using closed circuit television for training traffic operators.

The "on-line" terminals make excellent training devices. The computer can be notified that the operator is a trainee. The computer then responds normally in all respects except that the files are not changed by the student's actions. Programmed learning techniques can be used and records can be kept by the computer of the student's progress.

We have much to learn about "on-line" terminals and how this method of operation can best be applied in the telephone business. For example, uniformity of procedures may be in conflict, in some respects, with job authority and possibly job satisfaction. We face a real challenge in applying these new tools successfully. As was said before, the processes of production and employment must be viewed "as an integrated whole, with men and machines interacting with each other."

I have only just briefly touched upon the BIS concepts. For those of you who are interested in the Telephone Company's plans in this area, I have some copies for you of a new booklet prepared for our employees on the subject entitled "The Bell System's Approach to Business Information Systems."

Another growing use of data communications is for pure information retrieval, i.e., where the user does not change the information in file. Here is an example in the telephone business.

I am sure you have all, at one time or another, wanted to reach a telephone in some remote place. I am sure you have also experienced the delay involved while the operator attempts to find out how to get there and how much the call will cost. These delays not only disturb the customer, but they require extra operator work time.

The problem, simply, is one of file size. Each operator has in front of her a bulletin containing the routes and rates to frequently called points. Consequently, when she is asked for information about those places, she has immediate access. The infrequently called places, however, are not listed. To do so would require volumes of material at each operator's position.

When it becomes necessary for her to obtain information on calls to these remote places, she must go to a central file. Presently, she accomplishes this by calling in a Rate and Route operator, who has access to this central file - literally a mountain of books.

Last Fall the Northwestern Bell Telephone Company made some dramatic changes in this area. A large computer, big enough to hold the huge centralized file that we spoke of earlier, was programmed to answer questions from operators on rate and route information. Here's how it works:

Each operator in the Northwestern Bell Territory has, at her disposal, a data link to the computer. When a customer wants to place a call to say Rattlesnake Gulch, New Mexico, the operator goes "on line" with the computer, and keys in the Area Code and Exchange Code of the called number, along with the Area Code and Exchange Code of the calling number.

The computer searches its memory, finds the necessary information, makes the necessary computations, and assembles a voice answer-back message containing the rates for the call and what route the operator should use - all in a matter of milliseconds. This marriage of data communications and data processing has eliminated a costly and annoying operation.

Here is a change that data communications is making in the insurance business. As you know, insurance is sold by salaried employees of the insurance company and also by independent agents, sometimes called general agents. Today, more and more of the salaried insurance agents are being tied closely to their company's computer through data communications. The result is that these agents are able to arrange policies more quickly and settle claims faster. In short, they are giving much better insurance service.

In contrast, the general insurance agent writes policies for from 7 to 15 different companies. It would be uneconomical to install separate communications terminals for each of the companies. And yet, at the same time, he must somehow keep up with his competition, the salaried insurance agent. There is interest developing in establishing a common data communications system to serve the independent insurance agents.

Many more businesses are entering this new era of "service" competition. Their customers want firm quotes and orders confirmed while they are talking on the telephone. In many cases this will require direct "on-line" access to information in centralized files.

As more businesses begin to serve their customers "on-line," they must expect peaks in customer telephone calls. Customers aren't very considerate in the way they spread their calls. Airlines, brokers and telphone companies can attest to this.

Sufficient equipment and manpower must be provided to meet the peaks. With automatic call distribution this does not necessarily mean a concentration of force and equipment at one location. Since many offices will use the same centralized file and since the procedures will be uniform, the overflow telephone calls from one office can be automatically routed to other offices. This will spread the load and increase the efficiency of manpower and equipment.

Today there is great concern about employment in certain depressed areas in the country. Many of these people will not move out of the depressed areas into areas where work is available. One possible solution might be to bring work to these groups via communications. I am not aware of any studies that have been made on the feasibility of this approach. However, I would suggest it as a profitable avenue for research. As more communications is used by business, the physical location of manpower becomes less important.

Our Chairman of the Board, Mr. Frederick R. Kappel, has spoken many times and written many articles on the subject of management philosophy and business organization. Here are some excerpts from his recent article, "The Information Revolution: Every Manager's In It" which appears in the Winter, 1966, issue of the Columbia Journal of World Business.

> "Only top management can create the stimulating climate where manager and systems expert alike can contribute to each other and strengthen each other, and where both can grow in stature and achievement.
> It also remains to say that information systems utilizing modern computers and communications are bound to have great influence on business organization. As others have already pointed out, instant flow and feedback of information between any geographic points gives the management of large organizations a new capacity to centralize certain decisions. It should enable them to deploy operating forces to better advantage. Also, the new systems tend to cut across departmental structures based on functional specialization. We think, therefore, that organizational shifts are bound to occur as managements turn to new concepts based on bringing together functions that are now separated.
> This change we talk about is not just a matter of new gadgets, or travelling faster and faster, or of using new kinds of building materials. It is a change in people themselves, and in the balance of interest and skills that are needed to make a business go. So the business leader, I think, has as much learning to do as any beginner if he hopes to lead the new generation."

And, if the business leader has some learning to do about the new information systems and how they affect business operations, then I suggest the business educator has some learning to do, too. This research workshop is certainly a step in the right direction.

Paper 7

NEW DEVELOPMENTS IN BUSINESS DATA PROCESSING

J. A. Ramsen

In the broad sense of the words, it seems to me that the phrase Business Data Processing is redundant in that, to a large extent, Business *is* the processing of data. When our businesses were small, family owned and operated entities, we were able to carry on the necessary paperwork by manual methods with occasional aid from the desk calculator. When our businesses grew, we simply added more men and more calculators, and this was quite adequate up to a point.

We have for some time now been in the situation where the need for the processing of ever larger quanities of information has been gradually eliminating this manual type of business office operation. In order to effectively compete in the market of today, even the smaller firms have felt the need to use the electronic computer to store, analyze, and make reports on this vast quantity of information, and thus improve the efficiency of their operations.

It's a bit difficult at times to realize that the computer has really been with us for a very short time. The first commercially available computer was the Univac I which was installed at GE's Appliance Park in Louisville in 1951 -- just 15 years ago. This machine rented for about $25,000 per month. And the first really widespread use of computers did not come until until the IBM 650 began to make itself felt in 1956 -- just 10 years ago. This machine rented for about $4,000 a month, and we finally manufactured about 1800 of them; at that time more than the sum total of all other computers (our own included). You might be interested in the fact that our market research people forecast that the entire computing needs of the country would be satisfied by 50 to 60 of these machines. And we still sold 1800.

Last month the monthly computer census reported by Computers and Automation showed 31,391 computers currently installed. To add another figure to this mass, IBM expects to reach a production rate of 1000 computers a month by the end of this year.

Obviously this tremendous growth requires a correspondingly tremendous input of people. It has been estimated that there were about 25,000 data processing specialists in the country in 1960, there are about 200,000 at work now, and there will be roughly half a million people involved by 1970.

This, of course, brings up several problems:

1. Where do we find the people?
2. How do we train them?
3. Where do we get trained instructors?

Let's take them one at a time. First: Where do we find the people? Well, one of the logical sources exists in those people whose current jobs are being or will be replaced by the machines. Our way of life in this country is geared to continued progress and one of the requirements for this progress (one we too often forget) is that the people must progress also. In order to continually upgrade our standard of living, we must also continually upgrade our skills. It seems to me that one of the duties of those engaged in Vocational and Technical Education is to provide the means by which these skills can be upgraded. Of course, there will be those who don't want to move from their comfortable niche; who will refuse any attempt to upgrade them. These are also the people who will fight most vigorously against new advances which tend to obsolete this niche. But we can't afford to let them stall our progress. This country has become great by continually moving ahead and will remain great only by staying with this pattern. The great nations of the past have all come to the end of their greatness when they decided to merely hold what they already had and not push forward to new horizons.

Just as the Data Processing Revolution (and that's what it really is) has obsoleted jobs for those currently in the working population so has it obsoleted the jobs for which we are preparing our young people today. If we continue to educate our students for the business world of ten years ago,we are blindly leading them into obsolescence. It is necessary that we recognize the impact of data processing and alter our existing programs to reflect this recognition. It disturbs me when I find a young man graduating with a degree in accounting who has not been even slightly exposed to data processing during his years in college. The chances are good that any firm large enough to hire an accountant is also large enough to have data processing equipment installed. If this is the case, most of the controls that he has learned to apply as he works with his ledgers are now contained within the black box of the machine and he is lost. Don't misunderstand me, I'm not advocating replacing accounting courses with data processing courses; I'm advocating incorporating data processing into the existing accounting course.

I've sort of slid into the second question; but before I pursue it further let me summarize the discussion of the first. There are two major sources for the manpower needed to staff the data processing revolution:

1. Those whose jobs are being modified or eliminated by the use of the computer
2. Those whom we are still training to fill these jobs which have been modified or eliminated

Now let's get to question two: How do we train them? Let me quote a paragraph from an article by Mr. Larry Prince who is director of the Systems Analysis program at Miami University.

"In an attempt to utilize the potential of the rapidly developing computer, industry has resorted to stop-gap measures that have not only been very costly but have (in many cases) failed to produce desired results. Consequently, management has begun to question the effectiveness of computers and other electronic data processing equipment. However, in retrospect, it is apparent that the computer's effectiveness has been curtailed because of lack of planning and the availability of trained personnel. The misconception that a computer will solve all problems has now been recognized by most management, and a more orderly approach to new systems and automation is taking place. Hence personnel with training in the use of the tools mentioned above as well as in computing techniques are now in great demand."

The objective of the data processing program therefore should be to approach computer training and systems analysis systematically. This should probably start with the fundamentals of industrial systems, progress to the need for high speed electronic equipment, cover the fundamentals of equipment use, machine language programming and their assemblers and compilers (with a computer always available to the students themselves). This coverage of fundamentals would cover a two-year period and be accompanied by the appropriate mathematics courses, accounting, communications skills, business organization, social science and possibly statistics. I refer you to an IBM Manual entitled, "Data Processing Courses in Vocational and Secondary Schools" or a publication of similar title issued by the Department of Health, Education and Welfare which closely follows the same outline.

At the close of this two-year period, the student should be well qualified to accept a position as a programmer or systems analyst. As a matter of fact, many firms are now changing the requirements they have placed on applicants for these positions. Where formerly they required the college degree, in many cases, they will now accept the Junior College associate degree or certificate in data processing. For example, I've recently seen an article in the papers indicating that the State of Wisconsin has done just exactly this.

If we include the non-data-processing courses mentioned above in mathematics, business, and social science, we are also giving our students the kind of education they need in order to transfer to a college or university for the final two years toward the baccalaureate degree should they be so inclined.

One of the things that continues to surprise me is the lack of Systems Analysis programs at the college level. There are many Computer Science curricula at the bachelors, masters, and doctorate levels. However, these curricula are oriented towards the mathematical techniques used with the computers, not the application of these techniques to real-life problems. I feel that the Systems Analysis or Systems Engineering programs bear much the same relation to the Computer Science programs as Engineering does to Mathematics in the current University/College atmosphere.

It seems to me also that the Junior Colleges and Vocational Schools have concentrated too closely on the cookbook skills of operating and programming the computer when they have the opportunity and the duty to include this skills training in an overall framework relating to the way things really are in the world today. The day when a data processing worker was merely a coder translating someone else's flow charts into computer language is largely past. The data processing people now must be able to communicate with those whose problems they are attempting to solve and must be able to understand the problems before they can attempt to solve them. Simply to do with the computer the same calculations you were previously doing by hand does not take full advantage of the computer. As a matter of fact, it may be more expensive to do this with the computer than by hand. It's only when used to extend the data handling capabilities into the field of assisting management's decision-making processes that the computer really becomes a useful tool.

Of course you can run into difficulties if you carry this too far. I'm reminded of a cartoon which was prominently displayed on the wall of a college medical computing center I visited some time ago. It showed a hairy-chested man stripped to his shorts talking to his doctor. (You could tell he was a doctor because somebody had written Ben Casey on his white coat.) The doctor was saying, "I don't care what you think. The computer says you're pregnant."

This is obviously ridiculous but there are a great many people who ascribe mystical properties to computers as Mr. Prince indicated in the passage quoted earlier. I'm not sure that I don't consider this a greater challenge to the educational community than providing the data processing curricula we have just discussed. As I indicated earlier it seems to me to be of vital importance to provide an awareness of data processing, its possibilities and limitations, as a part of any curriculum where the student is going to be using the computer as a problem-solving tool in that discipline after graduation. Many colleges and universities now require a computer familiarization course of all students in engineering, Michigan and Purdue for example. This practice has also spread to Business students (Duquesne and Tulane for example) and even medical students (U. of Cincinnati). And this is all well and good but if it stops there it falls short of the ultimate purpose. That is, the use of the computer as a tool must be integrated into the subject matter courses themselves. Let me cite two examples:

At Wisconsin the College of Commerce has taken a very interesting approach in attempting to use the computer to assist in the teaching of accounting. Dr. Richard McCoy, Director of the College of Commerce Computing Center gave a talk on this program (called WISCAL, Wisconsin Accounting Language) at a computing center director's seminar in Poughkeepsie, New York two years ago. As he stated it, students in accounting quite often get so wrapped up in the number manipulation involved that when they reach the bottom of the ledger sheets and the debits and credits don't balance, they have no idea as to whether this was caused by an arithmetic error or by a misapplication of an accounting principal. Wisconsin's solution to this was to put their problem set on the computer so that now all the student had to do was to tell the computer the amount and nature of the transaction,whether it was a debit or credit, and what T-accounts it affected. The computer then performed the necessary mathematics to come up with the balances. Now if the account is out of balance, the student knows that he has misapplied an accounting principal since the computer normally does not make arithmetic errors. Dr. McCoy claimed three major benefits from this program.

1. The students got a clearer view of the accounting principals involved and therefore achieved a better grasp of same.
2. The students were given a feel for the use of the computer as a tool to help them solve problems.
3. The instructors were able to cover more ground since the dog-work computational requirements on the students were reduced.

Second, there is the approach taken by the Physics Department at Miami University. They include as a regular part of their beginning freshman course in Physics three lectures introducing the students to programming via the Fortran language. They then assign problems to the students which must be handed in with the flow chart and computer program by which they were solved. From this point on, they are not restricted in the type of homework problems they can assign due to length or complexity since the students have available to them the computer as a problem-solving tool. Their experience indicates that the students soon decide to handle all problems involving computations by the use of this tool.

In both of these cases, the computer has been viewed as a tool useful to the accomplishment of the aims already in evidence for existing courses and not strictly as an end in itself. To my mind this is the area of greatest possibility and responsibility for the vocational and technical schools as well as the colleges and universities.

The introductory course which quite often precedes the integration of the computer methods into existing courses is a logical point of departure. However quite often it is not only the introductory course but the final one as well. The so-called "survey" course undoubtedly involves some general benefits for its students but in most cases the benefits are fleeting unless followed by more substantial material relating the "survey" topic to the rest of the education spectrum. I would think that the introductory course as an end in itself would have applicability only on the adult retraining level for the vocational and technical schools and that its use even here should be kept to a minimum. To describe the operation of the computer and even how to program it without showing the retrainee how it can be applied in his job is to solidify his feeling of frustration at being replaced by a machine without giving him any means to control that machine.

The third question we asked ourselves some time ago was "Where do we get the instructors?" We have a real problem here brought about by the very recent emergence of the computer. Most of our instructors have probably been out of college for 10 years or more and, as pointed out earlier, this is almost certain to mean that their college did not have a computer much less courses involving the machine. In fact most schools did not begin to include the use of the computer as an educational tool in their curricula until five years ago or less. It's rather trite to say that you can't teach what you don't know (though I'm sure all of us can recall instructors who seemed to violate this principle.) On the other hand we must have instructors if we are to teach data processing. One source possible is local industry, particularly for evening courses where we are supplementing the salary industry is paying rather than competing with it. Such organizations as DPMA (the Data Processing Management Association), ACM (the Association for Computing Machinery), and others have been quite helpful in many cases in polling their members to assist education institutions in obtaining qualified instructors. In addition, several organizations such as the National Science Foundation and the Ford Foundation have sponsored seminars and training institutes to bring current faculty up to date in this field. The eventual solution however must come from the colleges and universities who train most of our future instructors. Schools of education in particular have been slow to see the handwriting on the wall and include the use of the computer as another tool of their trade. Pressures from the secondary schools and the vocational-technical schools will eventually force the changes required. Just as we now have courses in the handling of audio-visual equipment as a logical part of the education curriculum so will we have courses in the handling of data processing equipment.

The stated objective of this conference is to establish theoretical and practical bases for research in education for office operation, administration and technology. I believe the three questions I posed at the beginning of this talk do form a practical base on which such research could and should be forwarded. I've tried to give you some of the ideas I've been exposed to as one involved with both data processing and education. You may not agree with the emphasis I've placed on this area but I hope you agree with the need.

In connection with this, let me point to two new developments which appear to be accelerating the trend to change in the office of today. They are the development of very large direct access storage files and the development of the teleprocessing capabilities for the computer. At first the computer's handling of data was limited to the punched card and its 80 character restriction. With the advent of magnetic tape, the record length restriction was removed but so was the ability to get directly to the data on any one account, or inventory item, or student without looking at data for all of the other accounts, or items, or students with identification numbers less than the one we were interested in. This led to the "batching" of requests for information; running them once or twice a day, hardly the answer when we were trying to satisfy a phone call or a customer at the window. So we retained our file cabinets.

Recently however the direct access devices - disk files for example - have come into use. They can store tremendous amounts of data (4 billion characters on one current device) and retrieve information by going directly to it rather than sequentially processing the entire file. This however would still not be sufficient if the output device could only be located at the computer console as was originally the case.

Now however we have the ability by use of teleprocessing equipment to cable connect an output device such as a typewriter or a cathode ray tube from the source of the inquiry to the computer. With the use of commercial communications facilities as discussed by our friend from A T & T we can even connect the computer with inquiries across the city or the country or (I suppose) the world. Those of you who have ridden

American Airlines recently are aware that typewriter consoles at the agents location in the terminal connect directly with an inventory of available seats contained in a computer in Westchester County, New York, so that you can check on the availability of a seat on any American flight from any American agent in the country. The other major airlines have similar systems. It's possible now for a teller in a branch bank to key in an account number at his terminal and find out from the computer at the main bank downtown whether your account balance is sufficient to cover the check you're attempting to cash. He no longer checks the local branch files or calls in to the home bank to have a clerk there check that file. Instead he talks directly to the computer.

And in some cases the computer talks back. The telephone companies are planning to use such a device or may already be doing so to solve the problem you cause when you try to dial a number which has been discontinued. The operator now must interrupt your call, ask you for the number you called and then look through the file to determine whether the number has been changed, the person has moved or what have you. There now is an audio device available which has a vocabulary of several hundred words which the computer can assemble to form a message telling you why you did not reach the number you dialed.

This kind of communication ability with the aid of the computer and the large direct access devices may radically change the office of the future so that managements requests for information will not mean that a clerk will search through files but will mean instead that she will sit down at a keyboard and ask the computer for the requested information.

I'm sure that your imaginations have been able to see many uses for these capabilities other than those to which I have briefly alluded here. I'm also sure that you have questions which this talk has brought to mind. I trust our panel will be able to answer them in the discussion period following.

Thank you for your attention to my sometimes opinionated ideas on a subject with which I feel strongly involved.